August 1961

Man-made fibers—Annual review

Fiber property-trademark chart

How to cut stream pollution

Modern textile management

Complete contents on page 4

Textile Industries

a W. R. C. Smith publication formerly "Cotton" fifty cents per copy

University Microfilms
313 No First St
Ann Arbor Mich 4

Picker Overhauling Is Simple When You Depend On . . .

Aldrich Repair Service

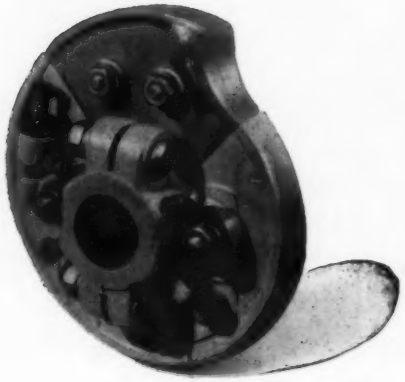
We furnish skilled men for reworking pickers, and can deliver to these men any needed parts within 24 hours in most southern states, and within 48 hours to almost any cotton mill in the United States. This makes thorough overhauling a simple matter. Anything needed for a good job can be had at once, while the machine is down for repairs.

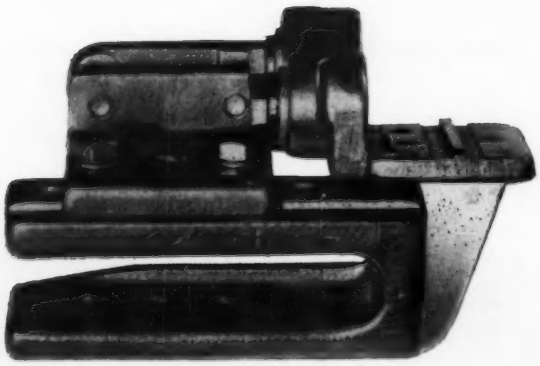
If you do your own overhauling, this speedy delivery service is just as valuable. You don't have to wait for repair parts — they are there when you want them.

We manufacture and install complete blending, opening, and picking systems for cotton and synthetics, and cleaning systems for cotton.

AldricH MachinE WorkS

Greenwood, South Carolina



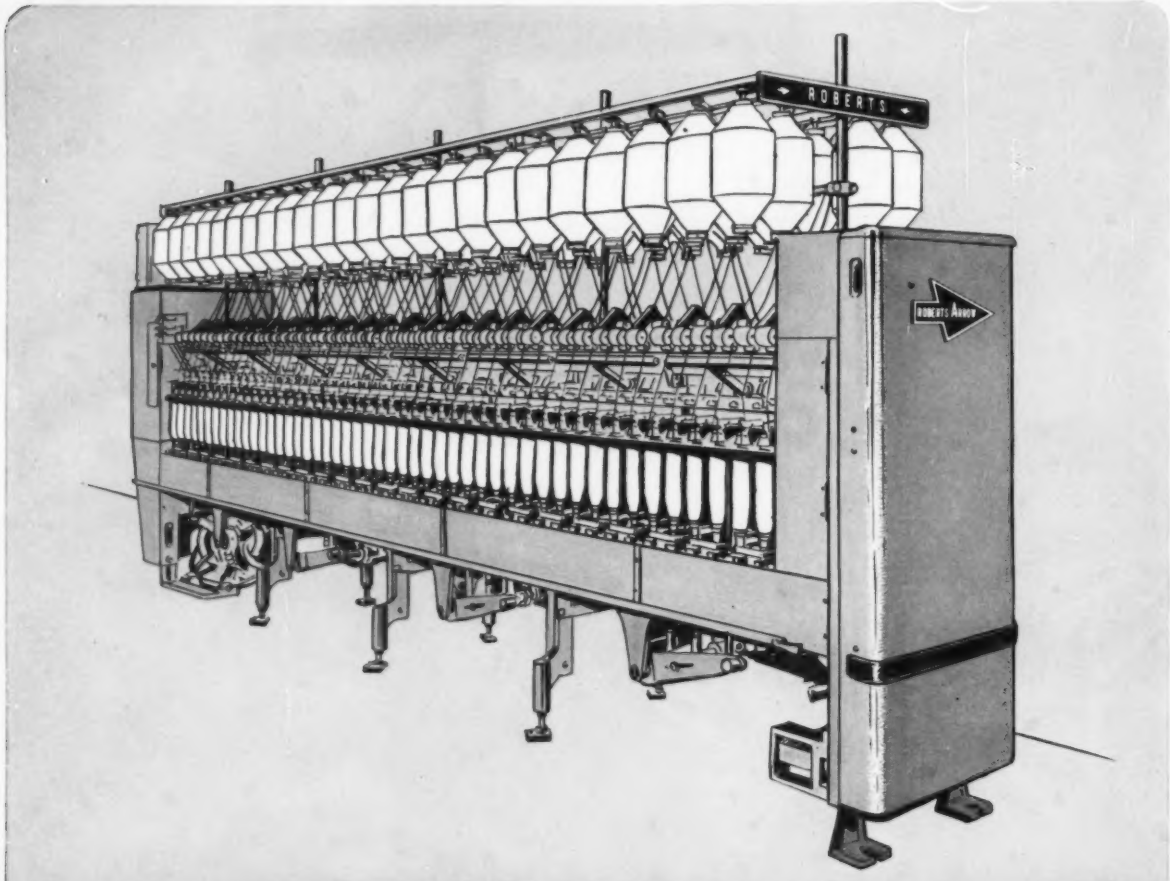


Draper repair parts are designed to give the maximum in loom performance ...day in, day out ...year after year.

DRAPER CORPORATION

The Mark of Quality

HOPEDALE, MASS. • ATLANTA, GA. • GREENSBORO, N.C. • SPARTANBURG, S.C.



ROBERTS ARROW

ADVANCED ENGINEERING DESIGN
ATTRACTIVE LOW PRICE
PRACTICAL MILL OPERATION

1200 NEW ROBERTS ARROW Spinning Frames with some 380,000 spindles have been installed in mills since their introduction four years ago; dramatic testimony that Arrow Spinning does the job to mill satisfaction!

RUGGED, ALL BALL BEARING and free of gadgetry and frills, new Arrow Spinning has been refined and streamlined, and engineered for peak performance and dependability. Many technological improvements have been incorporated.

HIGHEST YARN QUALITY! With new FC Drafting cotton system spinning, Arrow Frames consistently spin stronger, more even yarns. Proper fiber control, gripping and weight assure superior yarn quality.

INCREASED SPEEDS! Spindle speeds to 15,000 r.p.m., dynamic balancing of all components, and maximum use of ball bearings provide increased production and economy, with smooth and dependable performance.

WIDER VERSATILITY! Coarse or fine yarns from 2s to 120s count, cotton or synthetics and blends, and a broad range of drafts from 10 to 60 are successfully handled. New Arrow Spinning spins short or long staple cotton, and synthetics from 1 1/16" to 3". Changes in fiber, yarn number, draft, twist and bobbin build are quickly accomplished.

REDUCED CLEANING, MAINTENANCE! Strictly functional, new Arrow Spinning has been engineered for trouble-free operation with reduced cleaning and maintenance. Simplification of components, and fewer parts provide quick, easy cleaning.

ROBERTS COMPANY
SANFORD, NORTH CAROLINA

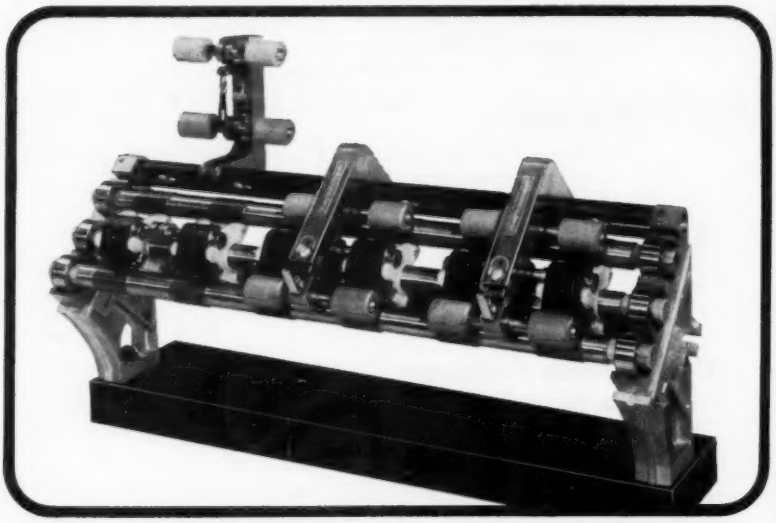
For further information use Handy Return Card, Page 191

YARN MAKING MACHINERY

ROBERTS NEWS

COTTON, WORSTED OR LONG FIBER SYSTEMS

Roberts FC Drafting System . . . Cleanest, Simplest, Best Yarn Quality



FC Drafting clears roll beam of all weighting attachments. Ball bearing bottom rolls on all three lines, shown above, are optional.

- Cleanest Running — Easiest to Clean
- Simplest — Fewest Number of Parts
- Highest Yarn Quality — Stronger, More Even Yarns
- Broadest Versatility — Cotton, Synthetics, Blends
- Short or Long Staple — Synthetics 1⅛" to 3"
- Coarse or Fine Yarns — 2s to 120s
- High Draft — 10 through 60
- Cartridge Weighting
- Roll Beam Clean — No Weighting Attachments
- No Lever Screws, Weight Levers and Hooks, Dead Weights
- PosiWate Pendular Arm Suspension — Positive Weighting
- No Oil in Entire Drafting Zone
- 3 Lines Ball Bearing Top Rolls
- Ball Bearing Bottom Rolls Optional
- Hardened Bottom Rolls with EvenGrip Fluting
- Nylon Cradles with Choice of Pin Opening
- Reduces Weight on Frame by ¾ of a Ton

ROBERTS COMPANY **Sanford, North Carolina**

Arrow Spinning Frames for Cotton and Worsted Systems • Twisters and Roving Frames
Tow-Transformers • ParaBlenders • ParaDrafters • AutoEveners

Roberts Company has achieved a most precision made cotton spinning system with its FC Drafting. It is the cleanest running, and the simplest with the fewest number of parts. It consistently gives the highest yarn quality from spindle to spindle and from year to year.

Dramatically new and improved in FC Drafting is a cartridge weighting arrangement which eliminates all weighting attachments to the roll beam, disposing of the lever screw, weight lever, weight hook and dead weight.

Used instead is an enclosed spring cartridge attached to a cartridge bar fastened between roll stands. A simple lever is depressed to unweight or to weight up the top rolls. There are no short springs inside the pendular suspension.

WIDE VERSATILITY

Coarse or fine yarns from 2s to 120s, cotton or synthetics and blends, and a broad range of drafts from 10 to 60, are efficiently handled by new FC Drafting.

Proper, efficient fiber control, fiber gripping and weight is provided without the limitations of other systems using short springs, weights or magnets.

FC Drafting can be arranged to handle short or long staple cotton, and synthetic fibers from 1⅜₁₆" to 3" long. A choice of cradle lengths and solid or recessed apron top rolls provides this flexibility.

One arrangement handles cotton up to 1⅜₁₆" long and synthetic fibers 1⅜₁₆". Recessed top apron rolls may be used for synthetics of 2" to 2½" long. Another arrangement handles regular running of long staple cotton up to 1⅜₁₆", or synthetics of 2" and less. The recessed roll extends this to 3" synthetics.

Send for Bulletin. **For further information on Roberts FC Drafting write for Technical Bulletin FC-101.**

EDITORIAL AND EXECUTIVE OFFICES:
1760 Peachtree Rd., N.W., Atlanta 9, Georgia
Phone: 874-4462, Area Code 404

EDITOR
George H. Dockray
MANAGING EDITOR
J. Frank Guest
ASSOCIATE EDITORS
Milton C. May
P.O. Box 11015, Charlotte 9, N. C.
Stanley M. Suchecki
P. O. Box 685, Ridgefield, Conn.
Jesse W. Ellington
ASSISTANT EDITOR
Ann W. Hardy
BUSINESS MANAGER
John C. Cook, vice-pres.
ADVERTISING MANAGER
Walter M. Mitchell, Jr.
BUSINESS REPRESENTATIVES
BOSTON—Arthur C. Shaw, 27 Southgate Rd., Wellesley 81, Mass. (Cedar 5-3648)
NEW YORK—William K. Hoffman, 58 Euclid Ave., Maplewood, N. J. (South Orange 2-2484)
BUFFALO AREA—J. D. Parsons, 39 Atlantic Ave., Cohasset, Mass. (Evergreen 3-0712).
PHILADELPHIA—James R. Corgee, 27 E. Windermere Terrace, Lansdowne, Pa. (Madison 6-9145).
CHICAGO—Hugh M. Aull, 333 N. Michigan Ave., Chicago 1, Ill. (Central 6-6964).
CLEVELAND—A. E. C. Smith, P. O. Box 3054, Cleveland 17, Ohio (Whitehall 2-1626).
CHARLOTTE—W. Cliff Rutland, Box 102, Gastonia, N. C. (University 7-7995).
LOS ANGELES—Warren R. Christian, P. O. Box 39711, Los Angeles 39, Calif. (Hollywood 2-1133).
SAN FRANCISCO—Fred Jameson, 821 Edenburgh St., San Mateo, Calif. (Diamond 3-8806).
GREAT BRITAIN—H. A. MacKenzie, 4a Bloomsbury Square, London W. C. 1, England.
GERMANY, SWITZERLAND & ITALY — Mrs. Wally Schottlaender, Schulzendorfer Str. 34, Berlin-Hellgensee, Germany.
FRANCE & BENELUX—Andre Jamar, 1 Rue Mallar, Verviers, Belgium.
JAPAN—G. E. Olcott, International Media Representatives, Ltd., Kioka Kurabu 14, Marunouchi, 2-chome, Tokyo, Japan.
MARKETING MANAGER
H. Redfern Hollins
SUBSCRIPTION SALES MANAGER
James G. Denton
PRODUCTION MANAGER
Joseph A. Moody

TEXTILE INDUSTRIES is published 13 times a year by W. R. C. Smith Publishing Co. William J. Rooke, chairman of the board; Richard P. Smith, president. Address all communications to 1760 Peachtree Rd., N.W., Atlanta 9, Georgia.
Copyright © 1961 by W. R. C. Smith Publishing Co.
Indexed in *Applied Science & Technology Index*.
Subscription rates: U.S. and possessions, $2.00 a year; Canada, South America, Central America, $5.00 a year; other countries, $10.00 a year.
Publication office: 116 E. Crawford St., Dalton, Ga. Second-class postage paid at Dalton, Ga.
Postmaster: Please send notices by Form 3579 to 1760 Peachtree Rd., N.W., Atlanta 9, Georgia.

Textile Industries

The Textile Management

SPECIAL MAN-MADE FIBERS FEATURE

65 A look at the record

Progress in the development of man-made and natural fibers and further improvements which may be expected.

66 Woven stretch

The critical problems you'll meet in designing and finishing woven stretch fabrics.

71 Progress in wash-wear rayons

High wet modulus rayon fibers seem to offer the greatest hope for the future, either with resins or with the new chemical cross linking finishes.

75 Man-made elastic yarns

The spandex fibers—what they are and their availability. Lycra spandex fiber—its properties and applications, and processing tips.

81 Improve Dacron-wool blends

Try these mill solutions to four problems in yarn making and finishing.

84 Printing glass fabrics

This printer's policy is to meet style trends in the drapery market. Right now its specialty is printing glass fabrics.

87 Overseas man-made-fibers developments

A review of recent foreign achievements and future prospects in the industry abroad.

93 BLENDS: Why stop at two fibers?

The three-or-more-fiber blends described may well be the forerunners of hundreds of such multifiber fabrics.

97 Launching a new fiber

How a fiber producer's marketing plan charts road to textile sales.

105 Properties and uses of the man-made fibers

Up-to-date revision of TI's annual chart, giving fiber properties by generic class.

112 Trademarks of man-made fibers and where to get them

Designations currently used by American man-made-fiber and textured-yarn producers, and sales-office locations.

August 1961

Volume 125

Number 8

and Engineering Journal

MANAGEMENT

25 Man-made fibers: Let's not rally round the flag

Plus opinions on cotton quality and some good news from Greenville's Southern Textile Exposition.

113 Modern textile management

Sales Anticipation Curves, a management planning and control aid.

115 Crash program needed, Robertson told SCTMA

19 "What we want in cotton"

21 "Watch for more Jap machinery, fewer Jap textiles"

WET PROCESSING

119 Better way to make cottons water repellent

With a new durable silicone alloy treatment, processing time is reduced and simultaneous application of crease-proofing resins is possible.

120 Swap chemicals for cleaner streams

Stream pollution by mills processing cottons and woolens can be reduced by judicious use of low-BOD chemicals. Companion reports—one for cottons and one for wool—tell how it can be done.

140 Coloring, bleaching, and finishing developments

142 New dyes and chemicals

KNITTING

149 Less paper work . . . happier customers

Pyramid's order handling system gets finished goods to the place that counts—in customer's hands.

153 Oil! Oil! Oil!

Not 1 in 10 users of SCP and SCOP machines lubricates them adequately. Here's the way it should be done.

162 Take burrs off F-F sinkers with ink erasers

163 Another tip for F-F mill management

DEPARTMENTS

6	Shorts and remnants	140	Coloring, bleaching, and finishing developments
17	News in brief	161	How others manage
23	Technical developments	165	New product parade
25	Executive views	130	Free booklets
27	Future events	185	Supplier notes
36	Mill notes	189	Index to advertisers
40	Personal notes		

THIS MONTH'S COVER

This month, beginning on page 65, TI presents 48 pages of information on the man-made fibers, including an 8-page pull-out chart giving details on fiber properties and trademarks.

IN TI NEXT MONTH

Wet processing

■ NEXT MONTH we will present TEXTILE INDUSTRIES' annual review of developments in wet processing; all fibers—cotton, wool, and man-made—will be covered.

Articles written for this review deal with such subjects as wash-and-wear rayons, resin finishing cotton knits, imparting permanent flat-press characteristics to worsted suiting fabrics, cost cutting in the finishing plant, the latest on fiber reactive dyes, rotary screen printing, and flash aging.

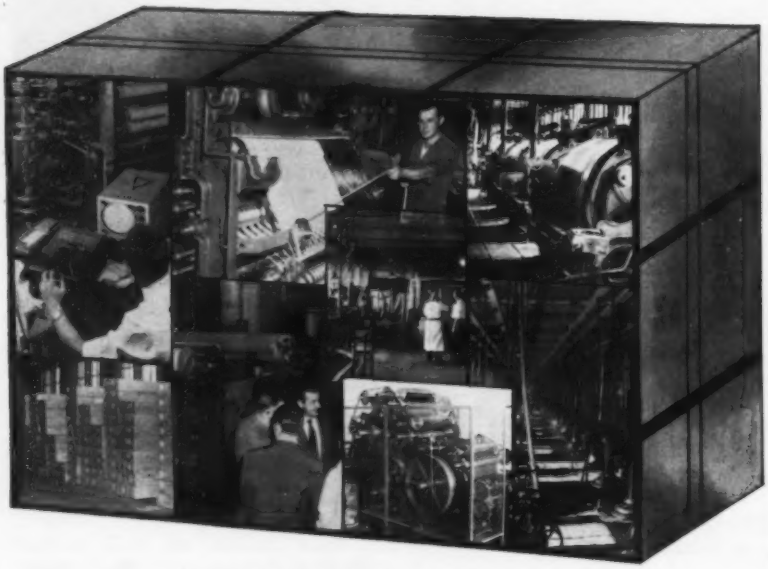
And . . . .

■ IS POLYPROPYLENE fiber overpriced? Will polypropylene staple sell for as low as 50¢ a pound in the near future? These questions have been much discussed, and they're answered authoritatively by J. B. Goldberg in an article, "What Price Polypropylene Staple?" to appear in the September issue of TEXTILE INDUSTRIES.

Proposed solution to cotton quality and price problems: Mills should own their own cotton plantations. TI presents this conversation piece in the next issue.

Also in September: Norbert L. Enrick discusses "Market Survey Aids in Management Planning;" mill men give their opinions, pro and con, on four-feed hosiery; and we'll take a look at the next decade in textile machinery.

"coordinated production" is a "PACKAGE" PLAN



ONE AIM (TO SERVE)

In D & F carding machines, "Coordinated Production" means a better return on your investment through improved efficiency, higher product quality and greater yield. It applies to machinery (new or already installed), plus accessories and expendable supplies (condenser aprons and tapes, card clothing, metallic wire and spare parts). Standard or special, depending on your requirements, these items can all be designed, produced and included for you by us — when and as needed.

ONE RESPONSIBILITY (TO FOLLOW-THRU)

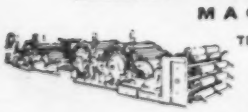
The sole responsibility for the complete package can be Davis & Furber's, backed by over a century of experience. Supported by D & F survey and service, in-the-mill analysis, D & F Engineers, Technicians and Erectors, you get the kind of satisfaction that only our aim (as stated above) can bring. Get the D & F "Coordinated Production" Package Plan because it is the insured way of achieving profitable performance throughout. Ask for full information.

ONE SOURCE (TO SUPPLY)

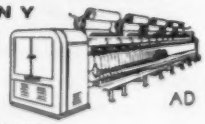
For satisfaction, investigate these products:

D & F Standard Cards
D & F Special Cards
D & F Card Clothing
D & F Condenser Aprons
D & F Condenser Tapes
D & F Metallic Wire
D & F In-The-Mill Technical Survey
D & F Preventive Maintenance Survey
D & F Modernization Plan
D & F Spare Parts Inventory

DAVIS & FURBER
MACHINE COMPANY



TEXTILE MACHINERY DESIGNERS AND MANUFACTURERS
North Andover, Mass.
Charlotte, North Carolina



AD 15-2.

Member — American Textile Machinery Association

CARDS • SPINNING FRAMES • PREPARATORY MACHINERY • WARP DRESSING MACHINERY • FINISHING MACHINERY
MACHINERY MODERNIZATION • ACCESSORIES, SUPPLIES, CARD & NAPPER CLOTHING, GARNET WIRE, TAPES & APRONS
SPARE PARTS • TECHNICAL SERVICE & CONSULTATION

SHORTS & REMNANTS

"Dear Mr. Editor:"

"I am going to open a clothing business . . . I request that you send me your catalog and the price list of the merchandise you handle . . . "

J. W. MEENA
Newport News, Va.

" . . . I easily could come to Atlanta if you can use my service. As a fully qualified mechanic I think I should be worth an hourly wage of $2.25 to you."

GOTTHOLD J. SCHLICHENMAIER
Chicago, Ill.

► Delta Air Lines' new flight from Atlanta to Las Vegas is designated, appropriately, "seven-eleven."

Everybody Asks TI

"Would you please send us a copy of the article 'Every Fifth Fuel Dollar Saved: Minette Mills' which appeared in the March 1960 issue of your magazine."

JAMES F. HUGHES
Marketing Services
McGraw-Hill Publishing Co., Inc.
New York, N. Y.

► Does Macy tell Gimbel?

Credit Omitted

We omitted the credit line on the photo we used for our front cover in June. The picture was made at Fitchburg Spinners Sales Corp., Fitchburg, Mass.; we're indeed glad to give credit to this fine mill.

Tex Calculator

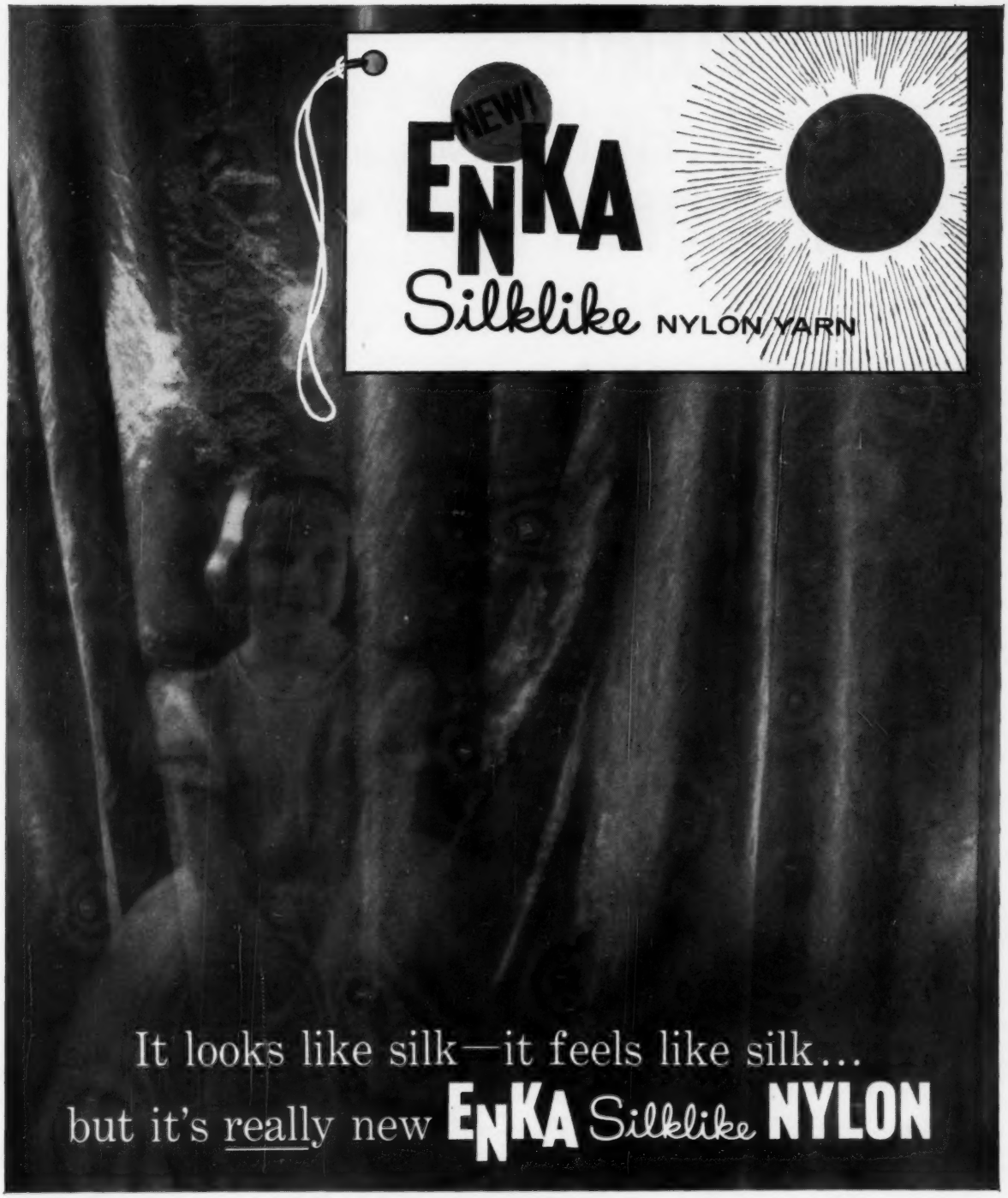
A slide-rule-type calculator for converting cotton, woolen, worsted, and denier counts to tex (and vice versa) is available. If you'd like one, write on your business letterhead to Edward H. Zimmerman, Publicity Coordinator, Fibers Division, American Cyanamid Co., 111 W. 40th St., New York 18, N. Y.

Another Correction

"The authors of 'Choosing the Best Draft' [TI for June, page 91] have just brought to my attention an oversight on their part in that they

Continued on page 10

For further information use Handy Return Card, Page 191



YOU can stump textile experts with this one. For amazing ENKA Silklike nylon yarn creates completely new sheer fabrics that are sheer magic.

Imagine the rich look, the luxurious hand of true silk PLUS the extraordinary benefits of nylon—and you have an inkling of the special kind of fabrics Enka Silklike nylon can produce. Naturally, this new yarn has strength and superb washability. Better yet, it has plenty of bounce and resiliency. Best of all, it dyes beautifully in either brilliant colors or subtle shades.

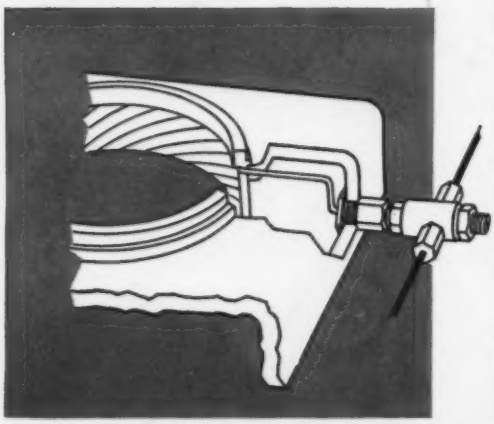
Its fashion uses? Children's party dresses, Junior and Misses cocktail and evening wear, bridal gowns, negligees are just a few of the markets for Enka Silklike nylon sheers.

And to launch this fabulous new yarn—Enka has planned a thumping promotional campaign introducing consumers to new Enka Silklike nylon in fabrics and fashions. Check on it TODAY at: Enka merchandising in New York, 350 Fifth Ave., PE 6-2300 or the District Sales Office nearest you.

American ENKA Corporation, Enka, N. C. • Producer of nylon • rayon • yarns • fibers
NEW YORK OFFICE: 350 Fifth Ave., New York 1, N. Y. • DISTRICT SALES OFFICES: Greensboro • Providence

ALEMITE FULLY ADJUSTABLE RING LUBRICATION SYSTEM

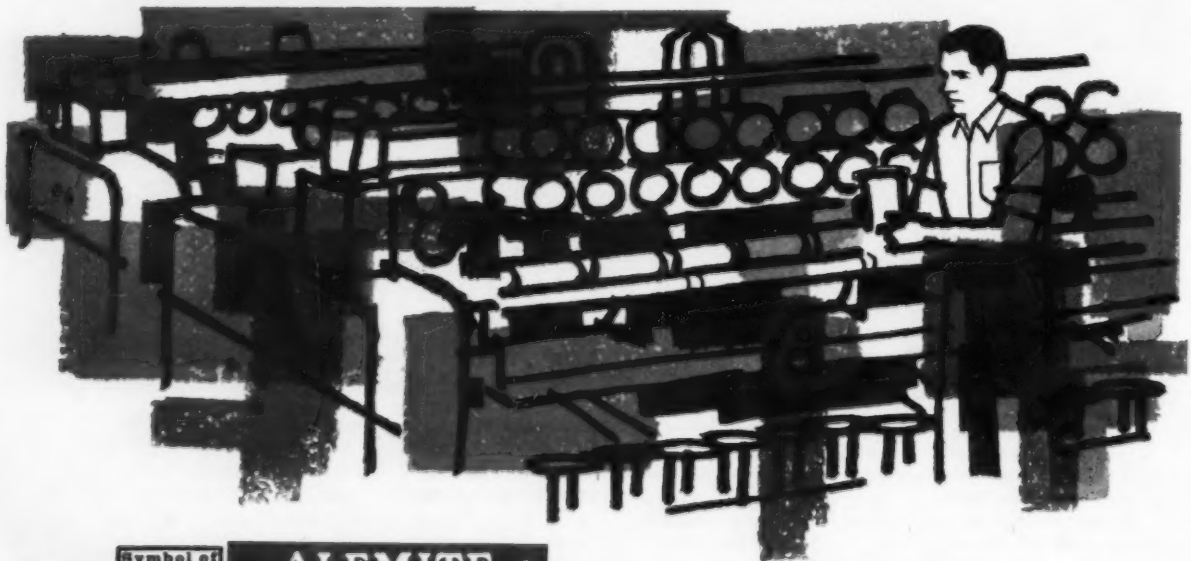
less ends down
cuts product spoilage
equalizes tension
increases ring life
reduces horsepower



This accurate, economical, low-pressure lubrication system increases production because it is fully automatic. Machines need never shut down to be lubricated. It maintains constant, positive lubrication—allows machines to run at higher speeds. Product spoilage is reduced because accurately dispensed amounts of lubricant are so minute, the traveler does not "throw" lubricant.

In addition, this Accumite system completely eliminates leakage between the ring and the frame . . . assuring neater, cleaner lubrication. It meters out positive amounts of lubricant to every ring on the frame rail to equalize tension, provide uniformity of thread—reduce lubricant consumption and prolong ring life. Accumite is adaptable to all lubricated rings.

Benefit from the many advantages by equipping your spinning and twister frames with an Alemite Accumite System. When ordering new frames specify Alemite. *Write today for additional information and free catalog #34-49.*



Symbol of SW Excellence

ALEMITE DIVISION
STEWART-WARNER CORPORATION

Dept. 0-81, 1850 Diversey Parkway, Chicago 14, Illinois

In Canada: Stewart-Warner Corporation of Canada, Ltd.
Belleville, Ontario

For further information use Handy Return Card, Page 191

This Saco-Lowell Rovematic Frame is now in operation in one of the nation's most modern textile plants.

Saco-Lowell's New Rovematic Increases Roving Output by 60%... Cuts Operating and Maintenance Cost Even More

Orders are being taken now by Saco-Lowell Shops for fall delivery of Rovematic Roving Frames. An entirely new concept that breaks with the past, Rovematic delivers a 14" x 7" package of superior roving with a flyer speed of 1,200 R.P.M. maximum and a front roll (1⅛") speed of 350 R.P.M. maximum.

Rovematic is specifically designed to set new industry standards. On the basis of actual mill experience, the production of 8 Rovematic frames has been equal to 13 conventional frames. Rovematic makes obsolete the heavy traversing carriage, cones, and all related mechanisms.

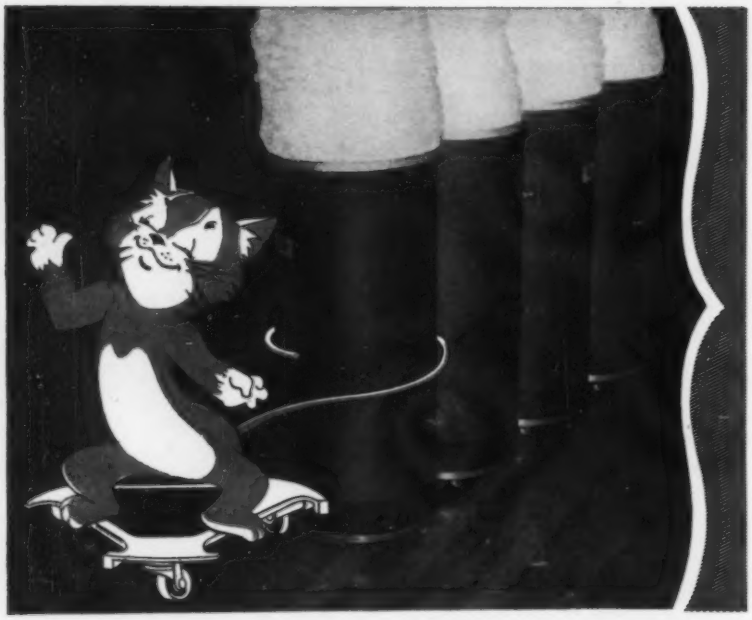
Built for Better Performance. Utilizing the FS-2 drafting system with Tru-Set weighting, Rovematic is easy to operate. Its unique telescoping spindle permits quick doffing without removal of the dynamically balanced flyers. Because its major components are enclosed in sealed cases and run in oil baths, with all change gears grouped together, Rovematic is the cleanest and the easiest-to-operate frame available.

Backed by Better Service. Behind the Rovematic, as behind all Saco-Lowell textile machines, lies a two-fold purpose: to give you the equipment and assistance you need when you need it... and to add to your profits through lower cost. Call in our nearest Sales Engineer today.

SACO-LOWELL SHOPS

TEXTILE MACHINERY DIVISION

EXECUTIVE OFFICES: DRAWER 2327, GREENVILLE, S.C.
SALES OFFICES: ATLANTA, GA.—805 PEACHTREE ST., N.E.
GREENVILLE, S.C.—P.O. Box 1698; CHARLOTTE, N.C.—P.O. Box 149;
GREENSBORO, N.C.—601 N. Elm St. Bldg.; SACO, MAINE—P.O. Box 230



SOUTHERN STATES LARGE COILERS AVAILABLE WITH NEW ALLEY-SKAT TO SPEED DOFFING AND CONVEYING

Large-size Southern States Coilers are now available with ALLEY-SKAT, the simplest, most economical can conveyor system ever developed. The problem of doffing and moving heavier cans may now be solved with a low capital outlay.

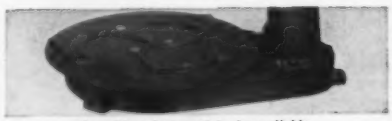
For example, suppose you are equipping your mill with large Southern States Coilers: if you decide to employ ALLEY-SKATS, you can specify that special cantable adapter plates be included at no extra cost. The only additional charge is for the can latches and ALLEY-SKAT dollies, which are available at nominal cost.

The latches and dollies are easily and quickly installed on any standard can.

The ALLEY-SKAT is strictly optional equipment. However, if you are concerned with handling large cans, as most mill men are, we suggest that you investigate the ALLEY-SKAT.

Get full information from your Southern States representative or write for Bulletin 501.

ALLEY-SKAT Dolly mounts to inside of can rim. Dollies are made of finest materials, including heavy-duty mill-type casters.



Cantable adapter plate is available as standard equipment on Southern States Coilers at no extra charge.

Doffing of large, tightly packed cans is quickly and easily accomplished. No lifting required.

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

SHORTS & REMNANTS

(from page 6)

listed the per cent CV of the slivers in Tables 2, 3, and 4 as having been made on the Uster tester when they were made on the Saco-Lowell sliver tester."

R. J. CHEATHAM
Chief, Cotton Mechanical Laboratory
SURDD, New Orleans, La.

Fiber Chart Popular

Before the 1961 revision (see page 105) of TI's fiber chart had even appeared, the requests for copies were coming in. If you'd like one, drop us a line; they're free, on the basis of one per reader. These were among the mill men requesting copies early in July:

L. J. Glass, Jr., v-p, Puritan Cordage Mills, Madison, Ga.; **George Tello,** plant supt., Louma Hand Prints, Inc., San Francisco, Calif.; **J. Robert Wagner,** asst. to gen. mgr., Formex Co., Knoxville, Tenn.; **C. E. Hoffmaster,** dir. of purchases, The Narrow Fabric Co., Reading, Pa.; **Garland Embry, Jr.,** Swift Mfg. Co., Columbus, Ga.; **Richard L. Porter,** pres., Quabbin Spinners, Inc., Ware, Mass.; **Frank B. Ward,** supt., Pacolet Yarns, Inc., Pacolet Mills, S. C.; **Harry Baylinson,** mgr., Marietta Silk Co., Inc., Columbia, Pa.; **J. D. Hammett,** dir. pers. & pub. rel., Central Mfg. Div., M. Lowenstein & Sons, Inc., Anderson, S. C.; **Henry A. Scheyer,** pres., North Bergen Piece Dye Works, Inc., North Bergen, N. J.; **Myron Severson,** plant mgr., Hickory Knitting Mills, Inc., Hickory, N. C.; **Clifford Gilpin, Jr.,** v-p, Downs Carpet Co., Inc., Philadelphia, Pa.; **Sam N. Wofford,** supt. wool spin-

Continued on page 16

Here we have Alexa Currey, last year's "Blue Jean Queen;" Sandy Johns, a candidate for this year's title; and Charlton Heston, an actor. We arrived on the scene just in time to hear Mr. Heston say, "Come on, girls, give me my pants. I've got a chariot race in an hour."

For further information use Handy Return Card, Page 191

PROCESSING THE SYNTHETICS ?

FIBREGARD

Reg. U.S. Pat. Off.

IS THE *ONLY* LUBRICANT THAT CAN GIVE YOU OUTSTANDING RESULTS!

FIBREGARD:

- increases the tensile strength of fibres
- eliminates static and ball-up or gumming during carding
- reduces tension because it provides adequate surface lubrication
- reduces breakage of treated yarns, increases loom efficiency and insures slick warps when used in warp sizing
- will not discolor white goods or change the shade of dyed goods or fabrics unaffected by plain water or an akalinity of 8.0
- scours out completely

FIBREGARD is the original colloidal lubricant—a smooth, viscous, flowable white cream instantly soluble in any water. It produces thin bodied, stable emulsions that have a pH of 8.0 and it is compatible with standard warp sizing formulas . . . starches, gums, etc. There is no other lubricant on the market today that can provide the outstanding benefits FIBREGARD provides. This is a matter of record in mill after mill throughout the country where this outstanding lubricant eliminates waste, saves time and lowers processing costs.

FIBREGARD being applied at the blender

Test these claims at our expense. Write, wire or call today for a free sample of FIBREGARD

HARRY MILLER CORP.

Original Products and Processes Since 1936

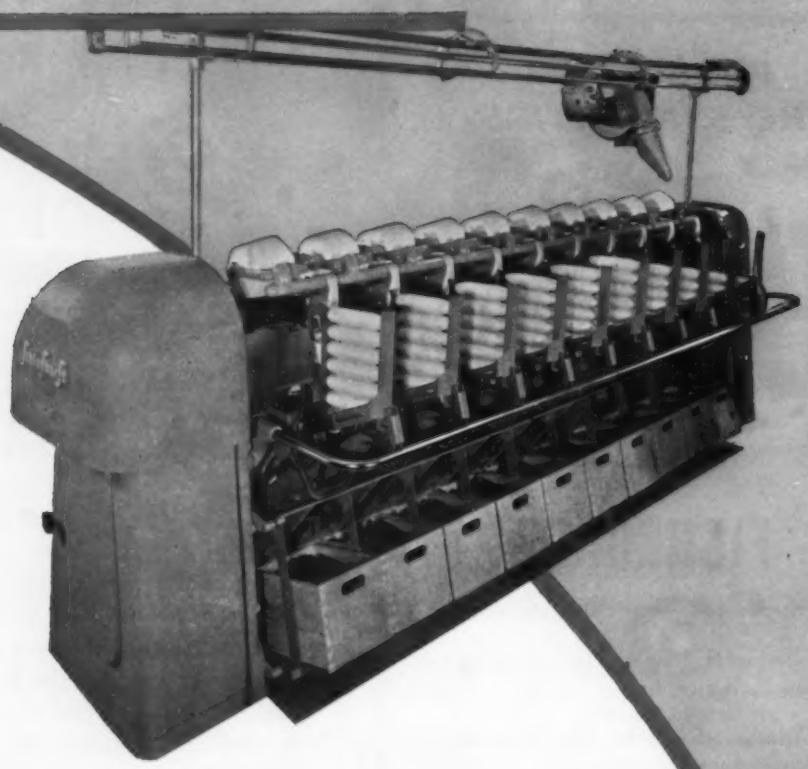
4th and BRISTOL STREETS • PHILADELPHIA 40, PA. • DAvenport 4-4000

Service Representatives in Principal Cities

HARRY MILLER CORP. HAMICO 4th & BRISTOL STREETS PHILADELPHIA 40, PA.

Manufacturers of

IMMUNOL • ACTIVOL • FIRMTAL GLYCOLA • POTENTOL • FIBREGARD



Schlafhorst AUTOCONER

The tremendous potential of this new, high speed, automatic and fully versatile cone and cheese winder is being reflected in this record:

OVER 40,000 SPINDLES

have been sold to textile plants in Europe, the United States and Canada. Why?

Lower winding cost

Larger and better packages

Full flexibility

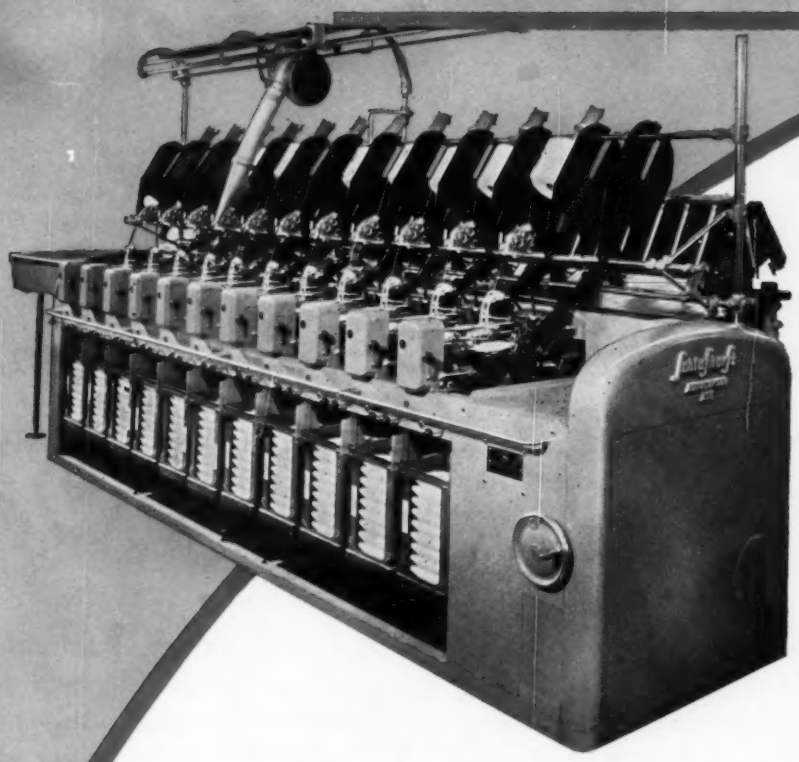
High machine efficiency

Simplified operation

Sold and Serviced by

THE TERRELL MACHINE CO., INC.

P. O. BOX 928, CHARLOTTE, NORTH CAROLINA



Schlafhorst AUTOCOPSER

INSTALLATIONS FIRST HALF 1961

completed, under erection or on order:

Aileen Mills
Avondale Mills
Bibb Mfg. Company
Cone Mills, Eno Plant
Cone Mills, Minneola Plant
Cone Mills, Pineville Plant
Cone Mills, Revolution Plant
Cone Mills, Tabardrey Plant
Deering Millikin Co., Inc.
Dominion Textiles, Ltd.
Eagle & Phenix Mills
Indian Head Mills
Joanna Cotton Mills
John P. King Mfg. Co.
M & F Worsted Mills
Muscogee Mfg. Company
Pepperell Mfg. Co., Dunson Div.
Russell Mfg. Company
Schwarzenbach Huber Co.
Spartan Mills
J. P. Stevens & Co., Inc.
Wabasso Cotton Company
West Point Mfg. Dixie Mills
West Point Mfg. Co., Riverdale Mill

AUTOCOPSERS are now furnishing filling for over

20,000 LOOMS IN 80 MILLS

in just the United States and Canada.

Sold and Serviced by

THE TERRELL MACHINE CO., INC.

P. O. BOX 928, CHARLOTTE, NORTH CAROLINA

J. D. Moore, Spinning Room Overseer of Muscogee Manufacturing Co., Columbus, Georgia, and John Bush, Armstrong representative, talk about cot performance. This frame is equipped with Accotex J-490 cots and NO-7876 aprons.

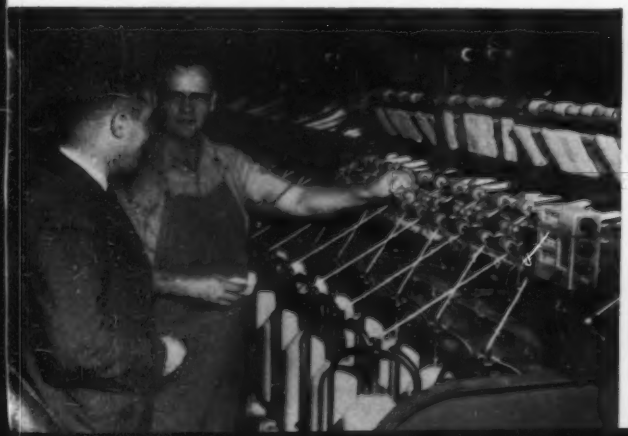
Combing . . . drawing . . . roving . . . spinning —on every frame, Accotex products help you turn out quality work

At every step in yarn preparation — from comber and drawing frame to spinning — Accotex roll coverings and aprons will help you build strength and uniformity into your production. That's true no matter what type of fiber or blend you're spinning, and no matter what type of equipment you're using.

When you specify Accotex products, you also get the benefit of the specialized training and experience of your Armstrong man . . . a man who can make dependable suggestions when you have questions about the selection or performance of roll covers and aprons. Here, for example, you see Armstrong man John Bush working with personnel of the Muscogee Manufacturing Company.

Be sure to call *your* Armstrong man on any roll covering or apron problem. Armstrong Cork Company, Industrial Division, 6508 Ivy Street, Lancaster, Pennsylvania. ACCOTEX® IS A TRADE-MARK OF ARMSTRONG CORK COMPANY

Bush chats with Joseph Griffin about the special electrolytes in the Accotex J-490 cots that minimize lapping. This frame also uses NO-7876 aprons.



J. D. McCosh is Overseer of Carding at Muscogee. This drawing frame has Accotex J-490 cots and Accotex clearer materials.

Bush is shown in the roll shop with James Payton on the left and William Thomaston on the right. Payton is Asst. Foreman of Carding and Thomaston is Foreman of the Roll Shop.

Armstrong

ACCOTEX COTS AND APRONS

IT MATTERS LITTLE

HOW SOME TUBES ARE MADE

...but Quality is a Factor in Most Cases

One of the least expensive components of rolled products in the paper and textile fields—tubes and cores—naturally gets the least attention.

Yet the precision and quality of the tubes or cores vitally affect the end product, in sales and repeat orders.

TPP Tubes and Cores are precision-made at five of our own modern plants. Raw materials are drawn from an unlimited number of sources to meet exacting requirements. Even the glue is aged with the care of fine wine to assure adhesive characteristics to meet TPP standards.

Couple TPP quality with unequalled service from 5 plants by our own trucks and you have the best buy of all in tubes and cores.

TPP TEXTILE PAPER PRODUCTS inc.

Specialists in tubes and cores for textile and paper industries

CEDARTOWN, GEORGIA Home Office and Plant
Other Plants In: Carlyle, Illinois — Crossett, Arkansas
Jacksonville, Florida — Mobile, Alabama

SHORTS & REMNANTS

(from page 10)

ning, Coats & Clark, Inc., Albany, Ga.; **Henry J. Newgard,** v-p, Adrian Industries, Inc., Adrian, Mich.; **H. Michael Strub, Jr.,** mgr. tech. dept., The Duplan Corp., Winston-Salem, N. C.; **John N. Soler,** sec., Muncy Fabrics, Inc., Muncy, Pa.; **H. R. Jones,** supt. No. 2 Mill, U. S. Rubber Co., Winnsboro, S. C.; **Harold D. Arsham,** v-p, The Cashmere Corp. of America, Ltd., Cleveland, Ohio; **W. V. Walukewicz,** tech. supt., Excelsior Finishing Plant, Pendleton, S. C.; **Roger Charbin,** v-p & gen. mgr., J. B. Martin Co., Norwich, Conn.; **John A. Boland, Jr.** gen. mgr., La France Industries, Inc., La France, S. C.; **W. J. Currie,** supt. of make-up, Bradford Dyeing Assn. (U.S.A.), Westerly, R. I.; **R. W. Simpson,** mgr., New Orleans Twine Mills, New Orleans, La.; **William B. Nelson,** PA, Greenwood Mills, Inc., N.Y.C.; **Harold H. Hedberg,** v-p, res., Albany Felt Co., Albany, N. Y.; and numerous others.

Why Not Indeed?

Sometimes TI's ad manager, the ineffable **Walter Mitchell,** asks questions that leave S & R baffled. Here's the latest one, and it concerns imports. Quoth he:

"The textile industry is screaming about cheap imports and insisting on protective tariffs and/or quotas. The government is afraid to comply, because such action might offend our friends (if such they be) in far-away lands.

"This is a stalemate. But suppose, instead of tariff or quota action, we merely insisted that foreign goods be sold in this country at a price comparable to the U. S. level? As an example, say that print cloth is selling at 18 cents a yard. Then we would rule that all foreign print cloth must be sold at no less than 17 cents a yard for a period of a month. At the end of this time the price would be readjusted to the market.

"This would remove the tariff stigma and put more money in the hands of underdeveloped countries. We would only insist that every imported product be sold at a price within a cent of the U.S. market. We are saying, in effect, 'Raise your prices. Get rich. Have chicken sukiyaki in every pot!' "

► This may be an old idea, and somehow it may be illegal, immoral, unenforceable, or worse. Would any of our readers care to discuss this with Mr. Mitchell?

For further information use Handy Return Card, Page 191

NEWS IN BRIEF

Kennedy Box Score: 2 Hits, 5 Errors? The textile industry is likely to see results from only two recommendations in President Kennedy's seven-point program,

according to a top official of a large mill group: 1. Depreciation allowances will be improved. 2. Compensatory payments will be made to offset the two-price cotton policy. Anything beyond these two possibilities is most remote and unlikely, he feels, and we had better plan accordingly. (The international export-import conference proposed by the President will of course be held shortly, but the mill official referred to told TI that he expects nothing tangible to come from it.)

Consumers Won't "Buy American." There is little evidence of

active sentiment in the nation to "Buy American" and little apparent effort at the point of sale to push domestic products over imports, Opinion Research Corp. found in a recent survey. Seven Americans out of ten purchased

Labor-Management News

TWUA-UTWA Pledge Mutual Aid. Textile Workers Union of America and United Textile Workers of America have agreed to help each other in their relations with the synthetic-fiber producers. Each union's locals at the producers' plants will be assessed 25 cents per week per member if a strike is called by any local to resist a wage cut or a reduction in fringe benefits. About 35,000 to 40,000 members are said to be involved in the agreement.

Correction. In our June issue we reported that as a result of an arbitration award a Textile Workers Union of America member had been restored to his job at American Thread Co., Clover, S. C., with full seniority. Actually, the arbitrator decided that the employee was guilty of not performing his job properly, as the company charged, but that there was no grounds for his dismissal. The discharge was ordered cut to a one-week suspension. However, the company appealed, and the Federal Courts ruled against the union. In the meantime, the company and the union settled the case out of court; terms of the agreement were not revealed, but the employee in question has *not* been restored to his job.

Can't Recognize Minority Union Exclusively. The Supreme Court has held that it is an unfair labor practice on the part of both employer and union to enter into an exclusive recognition contract when the union does not represent a majority, even though they may have believed it had a majority. The Court ruled in International Ladies' Garment Workers' Union vs National Labor Relations Board and Bernhard Altman Texas Corp. The facts showed that during an organizing campaign at Altman's knitting mill in San Antonio, the company in good faith credited the union's claim that it represented a majority and entered into an exclusive agreement without further investigation. NLRB later found that the union in fact only represented about one-fourth of the employees and it ruled that the execution of the contract was an unfair labor practice by both employer and union. It ordered the company to cease recognizing the union, and ordered both parties to cease enforcing their contract unless and until the union wins an NLRB election.

Canada Strike Avoided. Expected strike at Glendale Spinning Mills, Ltd., Hamilton, Ont., was averted when small majority of about 250 Textile Workers Union of America members at the plant voted to accept a new one-year contract. According to TWUA, the employees received the equivalent of 2-5 cents an hour wage boost.

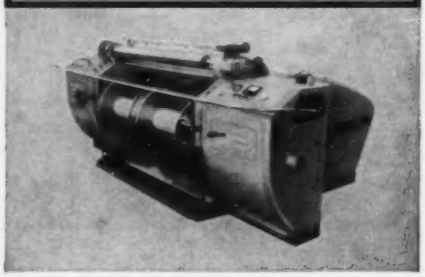
A Battery of Cocker Tricot Warpers in
One of the World's Finest Mills

The MB-55 offers great economies to mills which produce a wide variety of tricot beams. It will accommodate single beam widths from 40" through 55" between flanges, and double beams from 19" through 25" in width—up to 32" in diameter. Changeover from one assembly to another is rapid and simple.

Constant beam density, which is maintained by a horizontal plane presser roll, is another advantage of the MB-55. Loading of roll can be either pneumatic or hydraulic. Special presser roll carriage construction increases accuracy of roll loading.

The MB-55 provides an electro-magnetic brake for each presser roll assembly and for each spindle. This permits the most rapid stops—even at 600 YPM—without slacking or rolling of ends due to beam back-up.

The COCKER MB-55-32 Multiple Beam Tricot Warper is EXTREMELY VERSATILE



The MB-55-32 with
Dual Beam Assembly

Accessibility is another feature of this machine. Easily removable panels permit access to internal parts without disturbing the yarn or stopping the warper. Individual controls are within full view and easy reach of the operator.

The Cocker MB-55 offers you flexibility and economies not found in other tricot warpers.

Write for Full Information Today

COCKER MACHINE & FOUNDRY COMPANY

IN CANADA:
Contact W. S. Clark
Montreal, Canada
Oxford 7-2242

IN MEXICO:
Ing. J. Via, Jr.
I. La Catolica 45-911
Mexico, D. F.

PLANT & OFFICES
at Ranlo, N. C.
MAILING ADDRESS:
Gastonia, N. C.

WORLD'S LARGEST DESIGNERS
AND BUILDERS OF COMPLETE
WARP PREPARATORY EQUIPMENT

For further information use Handy Return Card, Page 191

at least one foreign product in the period covered, and there are signs that this acceptance is likely to increase. About ten per cent of the group included fabrics, draperies, and rugs among their purchases. Most consumers were found to have no predisposition toward either domestic or foreign products — they shop around and base their decisions on price and quality, ignoring the national origin of the merchandise.

Japan Less Enthusiastic. Japan's Prime Minister Ikeda, during his recent visit to this country, said that present quotas and demands for more quotas on Japanese textile exports to the U.S. were dampening the enthusiasm of some of

his nation's businessmen for further cooperation with the United States.

Textiles Looking Up — Russell. "To me it looks as though our economy is on the upgrade for the balance of this year and well into 1962," Thomas D. Russell, president of the Russell Manufacturing Co., Alexander City, Ala., said in a recent address. He added that the textile industry and his company should benefit from the upswing, "and by fall we should, by all the rules of the game, be in a comfortable situation."

OCDM Will Investigate. The investigation of the threat to national security posed by textile imports will continue, despite a request by the Association on Japanese Textile Imports that it be postponed indefinitely. AJTI claimed in support of its request that the international textile conference proposed by President Kennedy would be "foredoomed" if the investigation continued. OCDM officials said it would be illegal to postpone the investigation.

"What we want in cotton"

by J. L. Delany
General Superintendent
Joanna Cotton Mills Co.
Joanna, S. C.

Extract*

■ STRENGTH in cotton is paramount. The only way in which we can satisfy the needs of our cloth customers is often by giving them more and more strength. So a strong fiber is an absolute essential.

Fineness: This goes along with strength, for the more single fibers in a cross section of yarn, the higher the potential strength of the yarn will be. At Joanna, our coarse yarn needs can be met with a 4.50 maximum Micronaire. Our medium counts usually run best with the maximum yarn strength, using an average Micronaire of 4.00. The supercombed counts show their best performance with a 3.50 Micronaire. Needless to say, fineness without maturity is of no value.

Staple length is a must. It is quite noticeable that as we approach the ultimate counts in spinning value, we meet it only with an extra-long-staple cotton. If you were to ask the average spinning department overseer what he would prefer above all else in his cotton, his very first qualification would be staple length and lots of it. Nothing takes the place of staple length, so let us put that down as essential. I'd also like to point out that excessive gin treatment oftentimes reduces staple length.

Grade: I wish it were possible to bypass this subject. So many times the grade given to the bale is as phony as a three-dollar bill. Overheating and overworking the cotton at the gin have put a grade on the bale that in no way indicates (as it should do) its spinnability. Time after time gin tests have proved that yarn and cloth, made from such cotton, spin and weave very poorly as well as turn out a fabric of doubtful quality. At a time when spinners are desperately seeking for strength in cotton, the very people to whom they must go for their raw material can, at a turn of a switch, severely damage the very quality the spinner must have in order to stay in business.

Mr. Delany

At a meeting in Manchester, England, on April 7th, 1961, of the British Empire Cotton Growing Corporation, the chairman — James Littlewood — said that the character of American cotton has fallen off to such a degree that growers in other parts of the world are now able to command a premium over American cotton of similar staple and comparable grade. Mr. Littlewood further stated that it is no longer possible to rely on the traditional relationship between bale classification and spinning performance. All I have to say about this is that when the people who can buy our cotton at a very considerable amount less than what we pay for it can look a gift horse in the mouth, then you'll have to admit — we got a point.

I realize what the ginner must face from his customer, the producer. The ginner is there to render a service. On the other hand, the mill is in business too. Great amounts of money are invested in order to turn out fabrics in a most competitive market, greatly aggravated by foreign imports. The mill has to pay out huge sums in taxes and then stand aside while the foreign competition picks up U.S. cotton at about 25% less than the U.S. mills have to pay. Truly, the textile industry is the sacrificial goat of the U.S. business world.

Before I belabor this subject too much I'd like to say that as long as cotton is sold on a basis of grade and staple, rather than on that of its manufacturing quality, then we will be in a continual hassle with the ginners.

*From a paper presented by Mr. Delany at the recent Cotton Marketing Conference-Research Clinic.

Bemis developed these packages for the textile industry... so it's natural we know how to make them better

Poly Rack Bags and other Consumer Packages

Sturdy paper covers for textile rolls and carpets

Burlap Tite-Fit® Tubing

Waterproof (laminated) Roll and Carpet Covers; also waterproof (laminated) Bale Caps

Bemis is also a major supplier of soft-finish threads and twines and of burlap piece goods. Ask for the complete story about the help Bemis can give the textile industry.

where packaging ideas are born

General Offices—111-R North 4th St., St. Louis 2, Mo.

Sales Offices in Principal Cities

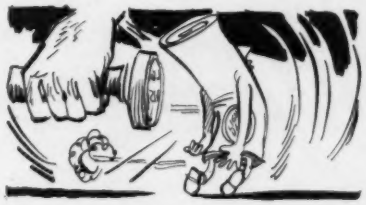
For further information use Handy Return Card, Page 191

Woven-Stretch Skirts. The first ladies' skirts made of woven stretch fabrics will appear this fall. Woven by U. S. Rubber Co. for Jo Ann Sportswear Co., the

filling stretch fabric is a 34-33-33 nylon-acrylic-rayon blend. (See page 66 of this issue of TEXTILE INDUSTRIES for an article on woven stretch fabrics, and page 93 for an article on multi-fiber blends.)

Rx for Cotton Quality Problem? "Premiums for real quality and discounts for measurable damage can provide the necessary incentive for correcting malpractices which now contribute to the problem of cotton quality damage," George S. Buck, assistant for research to the executive vice-president of the National Cotton Council, said recently. "This," he claimed, "is the only way to resolve both the problems associated with harvesting and ginning and those related to processing any cotton, with its natural variability, at the mill."

"PR" Goes National. A. & M. Karagheusian's "Performance Rating" system for carpets (see TEXTILE INDUSTRIES for June, page 25), is now in effect on a national basis,



after test marketings in Buffalo and Chicago. The carpets are given a PR classification of Light Use, Medium Use, Heavy Use, or Extra Heavy Use.

Clemson Raises Sights. Clemson College's School of Textiles will attract a large cross section of "our finest youth" if a master plan recently announced by President

Robert C. Edwards is successful. The plan: Closer alliance of the textile chemistry curriculum to the basic chemistry program; consolidation of the curriculum in Industrial Management into the Textile School (this will result in essentially a new school, perhaps the School of Industrial Management and Textile Technology); acceleration of basic research; more graduate-level education; and more service to industry, in the form of short courses and executive development programs.

Watch for more Jap machinery, fewer Jap textiles

Some findings of a textile machinery manufacturer's director of research on a recent visit to Japan

by Robert M. Jones
Saco-Lowell Shops

■ THE JAPANESE now have a ten-year plan devised by government working with industry . . . to double the gross national income. It is based on free enterprise and free markets with the objective to elevate the living standard and attain full employment . . .

The intent is to shift from light to heavy industry and chemicals . . . While textiles now represent about 20 per cent of Japan's exports, they [Japanese officials] expect this to diminish to 10 per cent by 1970 and machinery and chemicals will total 50 per cent of their exports . . .

Visited 3 Jap Mills. I saw the cleanest mill I have ever been in. It has modern machinery, all built within the last ten years; it made the finest quality broadcloths and poplin and some yarn as fine as 120s.

I visited another mill that had excellent machinery, most of it post-war. The buildings are mostly one story.

I visited a third mill that had 10,000 spindles of the much publicized sliver-to-yarn spinning, which was not very clean, used three times as much help as a U. S. mill, and made an inferior product.

In general, output per man-hour

Mr. Jones

in the U. S. mills is two to three times higher than in Japan, but hourly rates, including fringe benefits, are four to five times as high as in Japan . . .

Automated Mill. I did not see the much publicized automated mill in Japan. I don't believe any other American has either . . . We met the principals, who explained that it was still an experimental unit in the embryo stage and not ready to be seen. I have no doubt there are many good features and eventually it will become an operating unit. They admitted some of the so-called automated features were questionable economically.

(Another observation considered significant by this veteran textile machinery designer is the fact that whereas every major U. S. textile machinery development has been initiated by the machinery builders, in Japan they originated with the mills. Japanese mills spend from 4 to 8 per cent of their gross sales on research, Mr. Jones said, while U. S. mills spend about .2 of 1 per cent. On the other hand, U. S. textile machinery manufacturers, with sales totaling far less than any one of the big textile mills, spend 3 to 5 per cent of their sales on research and development, he pointed out.—The Editors)

An outstanding line of LOUIS ALLIS adjustable-speed drives from ½ to 2500 hp.

Louis Allis offers you a complete line of adjustable-speed drives with various characteristics for every application where adjustable speed is required.

Experienced Louis Allis field engineers, supported by regional and factory industry specialists, will help you select the best drive or drive system to meet *your* requirements.

The Louis Allis line of drives provides outstanding control features ranging from simple manual to precise electronic or transistorized control. Selection of control varies, of course, with the nature of the installation and the precision required. Where desirable, speed regulation as close as .1% is obtainable.

Controls can be provided which automatically respond to temperature, pressure, or flow. Other control features include threading, inching, jogging, logarithmic acceleration, torque-limit acceleration, tachometer feedback... and many other control provisions that can exactly tailor a Louis Allis drive to *your* operation.

For process plants or applications involving inter-related motors and multiple drives, Louis Allis engineers can provide complete "systems engineering," furnishing all electrical rotating components and control.

For expert assistance, call your local Louis Allis District Office listed in the Yellow Pages under "Electric Motors"...or write direct to The Louis Allis Company, 468 East Stewart Street, Milwaukee 1, Wisconsin. Ask for Bulletin 2900, "Louis Allis Adjustable Speed Drives."

*TM EATON MFG. CO.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

A55-336

For further information use Handy Return Card, Page 191

RECENT TECHNICAL AND COMMERCIAL DEVELOPMENTS

by J. B. Goldberg
Consultant to the Textile and Allied Industries

Exclusive

FIBERS AND YARNS

New Rayon for Industrial Uses. American Enka Corp.'s "Suprenka Hi Mod" continuous filament rayon is being offered for applications where high modulus, negligible wet or thermal shrinkage, and high strength are required. Claim low growth under load and excellent stability during processing. Typical uses seen in V-belts, conveyor belts, ducks, radiator hose, and carpets. Yarns are currently available as 1100/1100, 1650/1644, and 2200/2160.

New Ceramic Fiber. Experimental fibers made of beryllium oxide show promise as reinforcing agents in plastics or inorganic structural materials for high-temperature applications in rockets and planes. Melting point of 4650 F and tensile strength of up to 2 million pounds per square inch are anticipated.

Flameproof Fibers and Yarns. A U. S. patent was recently issued on flameproof cellulose organic acid ester fibers and means for producing them, achieving these properties by incorporating 0.2 to 3% of aluminum pyrophosphate.

"Silky Wool." A report from Moscow describes the development of a new technique for irradiating silk. After irradiation it is claimed that one pound of silk is converted by gamma rays along with the use of organic compounds to 1½ pounds of "silky wool." The improved fiber is said to have the combined properties of silk and wool, including their combined strength. The resultant product is represented as being superior to natural silk and wool in thermo-insulating properties along with resistance to solvents.

Spun-Dyed Tusson. American Bemberg's 450-denier Tusson slubbed rayon is available in 12 solution-dyed colors as well as black and white.

Modacrylic Filament Yarn. Union Carbide Chemicals Co. is reported to be offering limited amounts of a continuous filament modacrylic yarn for woven and knitted apparel fabrics. The yarn, identified as "Aeress," is said to have a tenacity of 2.5 grams per denier and is being made available in sizes of 75/30, 100/40, 150/60, and 200/80. Original experimental filament modacrylic yarn was known in the trade as "Fiber T."

Modified Nylon Yarns. The Chemstrand Corp.'s Development Center at Pensacola is reported to be investigating modified nylon yarns, including a deep-dyeing type, speckle and nub yarns, and types with permanent anti-static and anti-bacterial properties. Also under development is a solution-dyed continuous filament acrylic yarn for use in carpets.

"X" Nylon. At least two Japanese fiber producers are reported to be negotiating with the California Research Corp. on acquiring rights to manufacture a new "X" nylon. It is said that properties of experimental fibers made from this material are close to those of conventional nylon and polyester fibers.

Sparkling Nylon. The Du Pont Co. is now marketing a 6-denier "sparkling" nylon staple designed especially for use in throw rugs.

Amino Acid Fibers. A Japanese firm is said to be experimenting with the manufacture of amino acid fibers.

MACHINERY AND PROCESSES

Shuttleless Weaving for Glass Fabrics. Operating abroad, a shuttleless weaving machine is said to be the only one of its kind for producing a wide variety of high-quality fabrics from glass roving or staple yarns. Weaving speed is 150-220 picks per minute and continuous weft supply is inserted by spears, with laying and beating up carried out in a single operation.

New 2-for-1 Twister. The low construction of a new English frame is said to make doffing and loading easier and top threading reduces operative fatigue. The machine is designed for coarse yarn counts and features tape-driven centrifugal clutch spindles, ring separators, adjustable flyer tensioning, self-threading take-up guides, a large twist range, and easy adjustment of traverse guides.

Sonic Sealing of Fabrics. Recently demonstrated in New York was a device for high-frequency heat sealing of nylon, polyester, or acrylic fabrics, as well as films and plastic coated materials. A number of garment manufacturers are experimenting with the equipment and process. Bonds are said to be achieved at speeds of up to 100 feet per minute without the use of chemicals, adhesives, or heat. It is claimed that in some instances the materials are bonded by interlocking of the fibers at the seam rather than by fusing. The bonds are said to be washable and dry cleanable.

TEST METHODS

Tester for Elastic Fabrics. A machine for testing the load-elongation characteristics of elastic fabrics, such as those used in foundation garments, has been

Continued on page 29

On August 1, 1961, burlap tubing became obsolete!

Announcing

the revolutionary, versatile wood cellulose fabric, better than burlap for roll goods, packaging all items!

Fulton's sensational new DurLap tubing is a must for all manufacturers and shippers of roll goods and other bulk items. DurLap has extra strength and durability, assures safer shipping, and allows continuous re-use. Its extra resiliency enables form-fit packaging of a larger variety of sizes and shapes, and provides speed, versatility, and cost-cutting economies in the packing process.

Easy to use! Variety of widths, corresponding to burlap tubing width, from 30" through 54" to cover all rolls from 8 to 24-inch diameters. Simply slip material over item to be covered, pull tight and wire both ends. Your package is ready for shipment.

- **Backed by Fulton's 93 years of quality textile manufacturing**
- **For further information, contact FULTON COTTON MILLS now**

Check These Outstanding Advantages

- No lint, no odor, no grease, no oil.
- Water-repellent and super strong.
- More resilient knit for a neater form-fit.
- Takes and holds stenciling better.
- Elasticity lends itself to variety of wrapping methods.
- Custom-dyed colors and stripes, available in larger orders.
- Competitively priced.
- Money back guarantee.
- American made; no delay in delivery.

Fulton
COTTON MILLS

Telephone 688-1111
TWX: AT 24
P.O. Box 1726
Atlanta 1, Georgia

a division of Fulton Industries, Inc.

DURLAP TAKES UP WHERE BURLAP LEFT OFF!

For further information use Handy Return Card, Page 191

EXECUTIVE VIEWS

Man-made fibers: Let's not rally round the flag

THERE ARE three schools of thought about how to solve the textile-imports problem. The first says that we should keep them out; the second says that through superior know-how, better merchandising, and so on, that we can out-sell them; the third says that we should put aside selfish interests and welcome the chance to help our benighted brothers in far-away lands.

For the moment, we'd like to talk about School of Thought No. 2.

Just lately, we had a letter from one of this school's thinkers—the public relations agency for Manhattan Shirt Co. It said, in part:

> With all the discussion these days about mounting competition to the American textile industry from foreign manufacturers, we thought you might be interested in one company's opinion of how we may successfully meet this challenge.
>
> The Manhattan Shirt Company, more than 104 years young and a leader in its field, feels that American know-how can stem the tide. Their main points are that:
>
> - Foreign manufacturers cannot successfully compete in the development of man-made fibres
> - Synthetics and blends of synthetics and cotton have become the backbone of the men's shirt business
> - Manhattan, as an example, now does 60% of its dress shirt business in these no-iron fabrics, and this percentage has increased sizeably in recent years
>
> For these reasons, and more, Manhattan feels that American industry should constantly seek to develop new man-made fibers, knowing that manufacturers such as Manhattan are ready to help them sucessfully market something new.

We have no quarrel with Manhattan's Point 3—undoubtedly, as they say, they do 60% of their dress-shirt business in synthetics and blends of cotton with synthetics.

And it doesn't make any particular difference that Point 2 just isn't so. (In 1959, latest year for which we have figures, there were 79.3 million pounds of textile fibers used in business, dress, and military shirts. Of this, 74.8 million pounds were cotton and 3.5 million pounds were man-made fibers. 4.4% is hardly much of a backbone.)

What does cause us concern is Point 1—"Foreign manufacturers cannot successfully compete in the development of man-made fibers." This is a delusion, as we think has been amply proved from Chardonnet's nitrocellulose rayon (France), Cross and Bevan's viscose rayon (England), Whinfield and Dickson's polyester fiber (England), through Natta's polyolefin developments in Italy, and the Japanese discoveries in the field of vinal fibers.

If further proof be needed that successful synthetic-fiber research is by no means an American monopoly today any more than it was in the past, we think that one of the articles in this issue (page 87) provides it.

We certainly don't imply that the U.S.A. hasn't had its share of fiber firsts — nylon, the acrylics, glass, and others. And we do believe in a cheery smile and a stiff upper lip (a difficult combination). But let's don't fool ourselves — there are plenty of good fiber chemists who don't speak English, even with an English accent.

Without a doubt there will be more firsts for the U.S. synthetic-fiber industry, and there will be more firsts for the English, the Germans, the French, the Italians, the Japanese, and maybe even the Russians. And our firsts will be licensed all over the world, and foreign firsts will be licensed here (although we don't look for any trans-Iron Curtain reciprocity).

So we feel that Manhattan's Point 1 is wrong—it just isn't so, and if we lead enough people to believe that it is, we are under-

1886–1961

Thanks

—to the three generations of customers whose confidence in the quality of Standard Oil industrial lubricants, and whose continued friendship and patronage have enabled these products to enjoy sales leadership for the seventy-five years we have served the South.

STANDARD OIL

STANDARD OIL COMPANY (KENTUCKY)

For further information use Handy Return Card, Page 191

cutting our own case for the only real solution to the import problem, which is higher tariffs or lower quotas and preferably both.

At last — Straight talk on cotton quality

It is refreshing at long last to hear a representative of the raw cotton interests speak plainly and truthfully about the damage the ginner does to cotton quality. And that's just what George S. Buck, assistant for research to the executive vice-president of the National Cotton Council, did when he addressed the Council's board of directors recently.

As we report elsewhere in this issue, Mr. Buck told the board that premiums for real quality and discounts for measurable damage can provide the necessary incentive to halt these malpractices. Fine.

But that's not all. He also said, "The industry will have great difficulty in solving its quality problems so long as the government programs continue to provide, at the least, a refuge for damaged cotton and, what is still more serious, an incentive to damage."

If this was an isolated statement, we're happy—something is much better than nothing.

But if it signals the adoption of a new policy by the chief spokesmen for this politics-ridden fiber, the millenium has indeed arrived and our cup is running over.

Either way, thank you, Mr. Buck, and welcome to the club.

Good news from Greenville

We've always had a sort of proprietary interest in the Southern Textile Exposition, which is held every other year in Greenville, S.C. L. L. Arnold, who was our editor from just after the turn of the century until the mid-1920's, was one of the prime movers in starting the STE. So it's good news to hear that a new auditorium is to be built for the Show, and that it may be ready for the 22nd STE, scheduled for October 15-19, 1962.

No one would deny that the Show rates a new home. Each STE is bigger and is better attended than the last one, while for each Show the venerable Textile Hall sprouts more jerry-built annexes. At the 1960 Show even the annexes ran out, so that some exhibitors were across the street in an abandoned livery stable, or

FUTURE EVENTS

Date	Event	Location
Sept. 7-8	Combed Yarn Spinners Association annual meeting	The Greenbrier White Sulphur Springs, W. Va.
9	Southeastern Section AATCC	Callaway Gardens Pine Mountain, Ga.
12-14	Southeastern Maintenance & Engineering Show	War Memorial Coliseum Greensboro, N. C.
12-14	Southeastern Plant Engineering & Maintenance Seminar	Town Hall Greensboro, N. C.
14-15	Northern Textile Association annual meeting	Poland Spring House Poland Spring, Me.
14-15	Textile Processing Symposium, sponsored by American Gas Association	Clemson House Clemson, S. C.
15	Delaware Valley Section AATCC	Wilmington, Del.
15-16	Palmetto Section AATCC	Clemson House Clemson, S. C.
21-22	Carded Yarn Association annual convention	The Cloister Sea Island, Ga.
21-22	Southern Textile Methods & Standards Association	Clemson House Clemson, S. C.
21-22	Chattanooga Yarn Association outing	Read House Chattanooga, Tenn.
23	Piedmont Section AATCC	Hotel Barringer Charlotte, N. C.
27-29	AATCC national convention	Hotel Statler Buffalo, N. Y.
Oct. 5-6	North Carolina Textile Manufacturers Association, Inc., annual meeting	Carolina Hotel Pinehurst, N. C.
5-6	Textile Quality Control Association	Sedgefield Inn Greensboro, N. C.
7	Alabama Textile Operating Executives carding and spinning discussion—9:30 a.m.	Thach Auditorium Auburn, Ala.
11-13	Quartermaster Association national convention	Biltmore Hotel Atlanta, Ga.
11-21	International Knitting Machinery & Accessories Exhibition	Belle Vue Hall Manchester, England
11-13	Fiber Society	West Point, N. Y.
12-14	Symposium on Permanent Finishing, sponsored by Swiss Association of Textile Chemists & Colorists	Zurich, Switzerland
14	Textile Operating Executives of Georgia slashing and weaving discussion	Ga. Tech Atlanta, Ga.
14	South Carolina Div. STA	Clemson, S. C.
16-20	National Safety Congress	Hotel Hilton Chicago, Ill.
Nov. 1-2	Textile Engineering Div. ASME	MIT Cambridge, Mass.
1-3	Industrial Engineering & Management Clinic, sponsored by Industrial Management Society	Pick-Congress Hotel Chicago, Ill.
8-9	Chemical Finishing Conference	Sheraton Park Hotel Washington, D. C.
13-15	Narrow Fabrics Institute	Statler Hilton New York City

The Banker is a Good Man to know

The Trust Company of Georgia — which has almost 70 years of experience — believes that a banker and his client should have a close relationship. Because of this belief, at the Trust Company of Georgia you will find that the Senior Officers are available to their customers. Find out for yourself how this open-door policy in banking can work to your advantage. The Trust Company main office is located at Edgewood and Pryor and there are six other banking locations in Atlanta. Experienced officers to serve you are available at all these locations.

TRUST COMPANY OF GEORGIA

Banking Since 1891

Member FDIC

ATLANTA

MAIN OFFICE
Edgewood at Pryor

MOTOR BANK
Behind the main bank

BUCKHEAD OFFICE

EAST ATLANTA OFFICE

LENOX SQUARE OFFICE

WEST END OFFICE

WEST PEACHTREE OFFICE

For further information use Handy Return Card, Page 191

whatever it was.

From time to time there is talk of moving the STE away from Greenville—to Atlanta, or Charlotte. We think it belongs in Greenville, the geographical center of the industry, and we're glad to see a development which should quiet talk of moving the STE for years to come.

In addition to complaints about the hot, ramshackle old Textile Hall, mill men and exhibitors have had other criticisms of STE. We listed some of them in our November, 1958, issue: Lack of badges (you couldn't tell the players from the spectators), too many of the idle curious and souvenir hunters, suppliers who set up competitive exhibits in hotel and motel rooms, lack of hotel space, and others.

The badge situation was taken care of in 1960, and that automatically got rid of the sightseers. If the new hall can take care of all those who want to exhibit, there should be no more competitive exhibits.

The hotel situation probably will never be completely satisfactory; after all, Greenville is a small city and can't keep hotel rooms in storage for once-in-two-years use. But in 1962, Textile Hall Corp. is going to cooperate with the local hotels and motels in making reservations for the week of the Show (as was done last year for the Atlantic City Show), which should at least organize the confusion. We think this should be extended to Spartanburg, Greer, Clemson, and other nearby towns.

One other constructive step that we think should be taken is the formation of an Exhibitors' Council. Lack of any voice in the operation of the Show has long been a sore point with suppliers and particularly with the capital goods manufacturers, the members of the American Textile Machinery Association. If this is done, perhaps it will forestall a repeat of the preposterous situation we had last year, of two major textile shows within five months of each other.

G.H.D.

Technical developments *(from page 23)*

developed in England and will be demonstrated in New York this fall.

Electronic Yarn Inspection. Developed through joint efforts of a British machinery manufacturer and a Belfast firm, a new electronic device serves to inspect yarn at 1,800 ft per minute. This equipment detects faults and measures lengths of small fiber disturbances, grading them into five different length groups, and counts the number in each group. A high degree of correlation is obtained between distribution of yarn fault lengths and spinning machinery irregularities.

FABRICS AND PRODUCTS

Tough Fiber Glass Fabrics. J. P. Stevens & Co., Inc., is reported to be producing a unique high-modulus glass fabric for use as a lining in cargo and baggage compartments of the new Boeing 727 and the modified Boeing 707 jet transport planes. The material is claimed to have greater impact resistance than an equivalent weight of stainless steel.

Increased Ice Strength. A method in use by the Rome Air Development Center, Rome, N. Y., to increase the strength of ice involves mixing of glass fiber strands with water before freezing.

Flameproofed Wool Blanket. A 62" x 82" wool blanket that is claimed to snuff out flames quickly and completely is being marketed by a Pennsylvania company. It is designed for use as a safety appliance in chemical plants, laboratories, foundries — wherever personnel are exposed to fire hazards.

Fire-Resistant Cloth. Another Pennsylvania concern is manufacturing a combination aluminum foil-asbestos fabric for fire entry and approach garments.

Polyester-Backed Carpeting. Described as a revolutionary new aircraft carpet, Collins & Aikman's "Royal" has a space-dyed loop pile of textured Caprolan nylon and a backing of 100% polyester fiber. Featured are light weight, high abrasion resistance, and dimensional stability after repeated cleaning (less than ½% dimensional change after 100 cleanings).

Reversible Suiting. A new Dacron polyester and rayon seersucker suit is said to be reversible.

Boosted into orbit in a package, this 30-ft expandable space station made of fabric could be inflated into shape to permit one or more persons to live and work inside the tube for an extended period of time. If the go-ahead were given today, the U. S. could have a manned station in orbit in about three years, using present technology, says Goodyear Aircraft.

Now

UNIFIL®

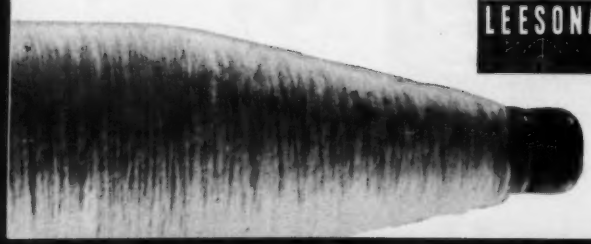
features 8¾" quills for cotton weavers

The 8¾" quill UNIFIL developed specifically for the cotton mill is another example of how Leesona's applied textile knowledge leads to textile machinery that improves manufacturing, reduces costs and results in higher quality fabrics.

Call your nearest Leesona Sales Engineer — in Boston, Philadelphia, Charlotte, Atlanta or Los Angeles. Or write LEESONA CORPORATION, P. O. Box 6088, Providence 4, Rhode Island.

LEESONA

Leesona Leads to Better Fabrics



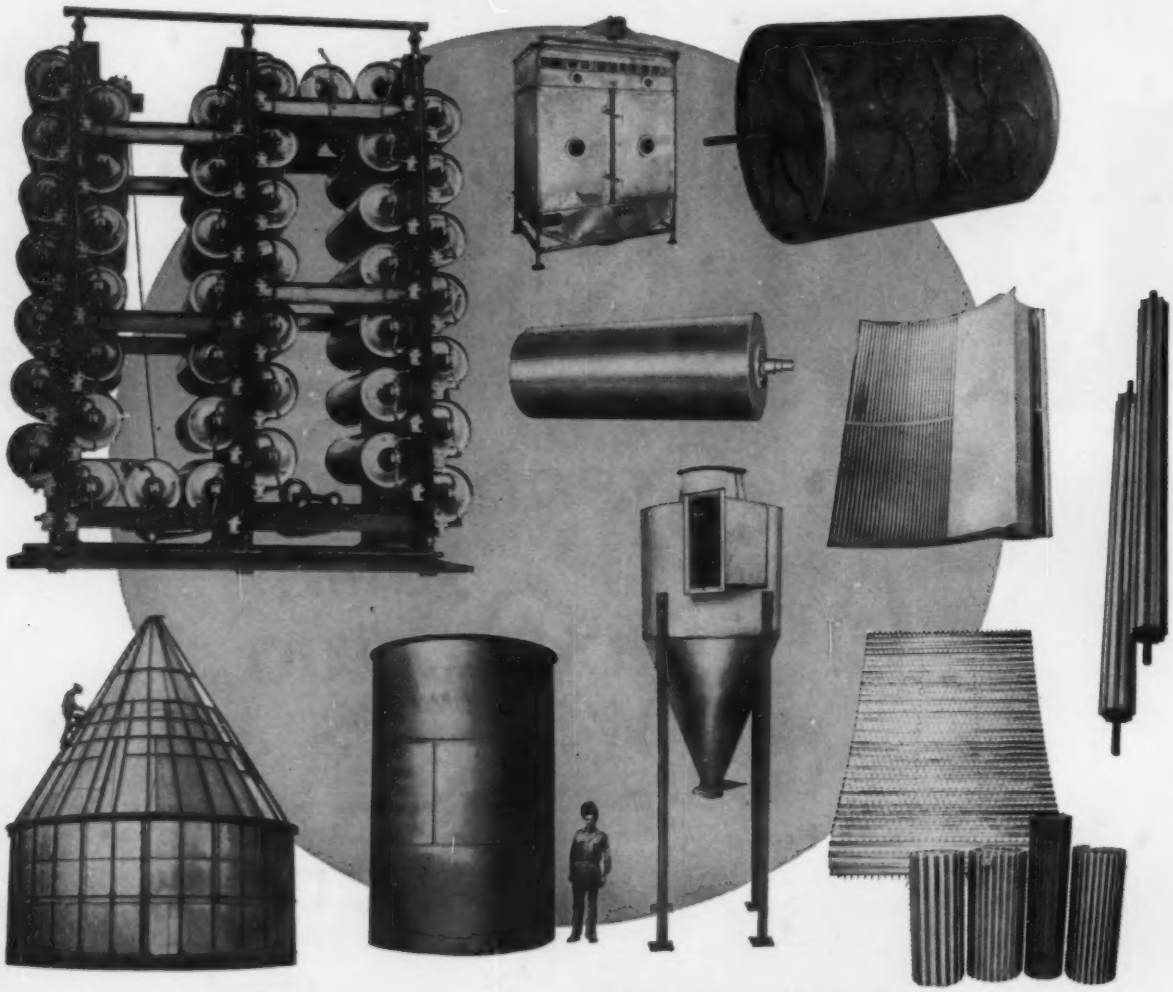
23.1.39

"Custom tailors" to industry

Since 1926, Sims has been designing and fabricating the specialized equipment called for in the manufacture of textiles.

As "custom tailors" of stainless steel, Sims' recommendations, designs, and fabrications are dictated by your particular problem, need, requirement or application of equipment. And, Sims specialists are on the job from start to finish to assure meticulous attention to even the smallest detail... the craftsmanship that unconditionally guarantees that the finished product will meet and surpass your most exacting specifications.

rolls · vessels · kettles · coils · size boxes · linings · cylinders · machinery · air and material handling systems . . . for textile · chemical · food processing · pulp-paper and other industries



Write, wire or call today for complete information:

Harley D. Hohm, Inc., 128 Buist Ave., Greenville, S. C.
Friday Textile Machine & Supply Co., Gastonia, N. C.

Sims
METAL WORKS
WEST POINT, GEORGIA

Specialists in
Stainless Steel Fabrication

For further information use Handy Return Card, Page 191

The cone nose... *how important?*

It is extremely important — in fact, it is one of the *most important* features of a cone. The correct nose insures free delivery of the yarn and this means a savings to you. Over the years Sonoco has devoted continuous research to perfect this one feature because it is essential to have the right "nose" *matched* with the yarn and processing conditions.

For example, the Regular or Crimped Round Nose is satisfactory in most instances, however the Straight Round Nose was developed for yarn with high moisture content and where relative humidities are excessive. There are varying degrees of crimping and rolling which permit a variety of sizes of holes in the cone "nose". "Plain Point" is a square cut "nose" not machined in any way. All "nose" types can be lacquer tipped, giving them a smooth, hard, moisture-resisting surface and a positive means for yarn identification. Dyes can also be applied for identifying purposes.

Continuing technical developments of this type, plus the consulting services of qualified sales engineers, provide an extra ingredient of quality representing more than 60 years of progress. *Only Sonoco,* in its field, provides the research and integrated manufacturing facilities required to serve the textile industry. *Let Sonoco experience help you!*

SONOCO

Products for Textiles

sonoco

9097

SONOCO PRODUCTS COMPANY, HARTSVILLE, SOUTH CAROLINA • Mystic, Conn. • Akron, Ind. • Ravenna, Ohio • Lowell, Mass. • Holyoke, Mass. • Phillipsburg, N. J. Longview, Texas • Philadelphia, Pa. • La Puente, Calif. • Fremont, Calif. • Atlanta, Ga. • Richmond, Va. • **MEXICO:** Mexico, D. F. • **CANADA:** Brantford, Ont. • Granby, Quebec

Weaving Problems?

SEND FOR A P&F TEXTILE SERVICE MAN!

The know-how of our textile experts goes far beyond the proper use of P&F starch products, and so do their suggestions. Each man on our technical service staff brought to his job outstanding technical skill and problem-solving ability—the basis of selection. Further experience as a Penick & Ford representative broadened and deepened his knowledge in the textile field. Behind him are the personnel and facilities of P&F's advanced research laboratory.

If you're interested in improving your operations—and who isn't—don't overlook this opportunity to get a fresh slant from a "pro." No strings attached.

Penick & Ford

PENICK & FORD, LTD.

INCORPORATED

1531 Marietta Blvd., Atlanta, Ga.

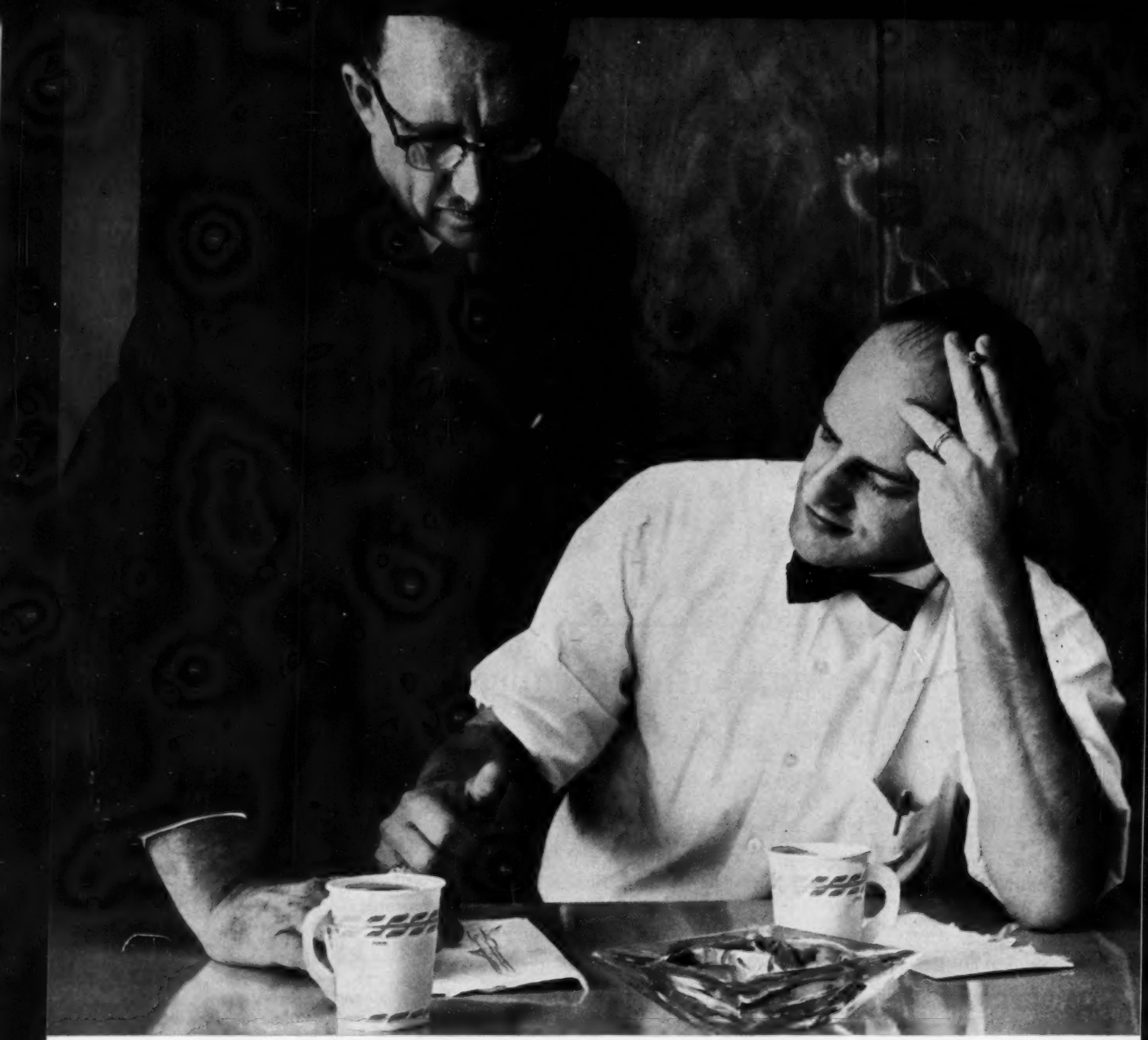
The P&F Textile Service Man tests yarns and fabrics for added weights, tensile and other properties

Checks out your warp sizing, finishing and glazing solutions under actual production conditions

Studies equipment and methods . . . uses his wide experience to help you attain top performance

More than 500 varieties of starches and starch derivatives in these families: Penford Gums • Pensize Gums • Penford Finishing Gums • Essex Gums • Clearsol Gums • Douglas Pearl Starches • Douglas Modified Starches • Douglas Dextrines • Douglas Oxidized Starches

For further information use Handy Return Card, Page 191



How a coffee break saved 3 hours per frame per year!

It happened one morning about a year ago during coffee break at our Research and Development Center at Clemson. ■ One of our engineers from the Development staff was describing a problem he had run into with a small part on the pilot model of the new Rovematic frame. It didn't have the durability he wanted. A Research Department engineer had a sudden inspiration. He thought of a way to relocate the part so that it would not be subject to as much stress, and consequently should last a lot longer. Coffee momentarily forgotten, the two worked it out, and the change was made. ■ The result is that three hours per year — the down-time that might have been required for the replacement of that particular part — have been eliminated on every single Saco-Lowell Rovematic frame. ■ A lucky accident? Not at all. It expresses our whole philosophy in building our Research and Development Center. Its purpose: to stimulate interaction of skilled and dedicated specialists in an academic atmosphere. No matter what the problem our engineers are tackling, they can turn to other fresh minds for new opinions, new approaches to making better textile machinery and providing better textile service. For, at Saco-Lowell, all our products are **built for better performance . . . backed by better service.**

THE STANDARD OF QUALITY AND PERFORMANCE Since 1813

SACO-LOWELL SHOPS

TEXTILE MACHINERY DIVISION

EXECUTIVE & SALES OFFICES — GREENVILLE, S. C.
BRANCH SALES OFFICES — ATLANTA, GA., CHARLOTTE AND GREENSBORO, N. C., GREENVILLE, S. C., AND SACO, MAINE

For Micronaire testing . . .

IMPROVED...

Faster-weighing, easier-reading SHADOGRAPH® Scales

A new optical system, developed by The Exact Weight Scale Company, provides the Shadograph with greater-than-ever visible accuracy. Its shadow-edge indication is sharper, easier to read, and contributes to faster operation.

Model 4104-A, above, is specially designed for weighing samples in conjunction with the Sheffield Micronaire testing machine. Dial is graduated with 1 inch of indicator travel equal to 15 grains, over and under.

Extreme accuracy, plus greater speed and easy-to-read indication make Shadograph the choice of cotton shippers, brokers and mill operators both here and abroad. The Shadograph is another precision product of Exact Weight, leading manufacturer of job-engineered scales for more than 45 years.

Model 103 Exact Weight Scale for control of cone and spool weight.

Model 4142 Shadograph for determining yarn count number. Direct-reading eliminates use of conversion tables.

Shadographs are available for color control, slashing, sliver test, denier test and check-weighing operations.

WRITE FOR BULLETIN 3328

Exact Weight SCALES

THE EXACT WEIGHT SCALE CO.
922 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: 5 Six Points Road, Toronto 18, Ont.

Sales and Service Coast to Coast

Find us in your local "Yellow Pages"

BETTER QUALITY CONTROL . . . BETTER COST CONTROL

MILL NOTES

Circle Dyeing & Finishing Corp., Paterson, N. J., has purchased the screen printing equipment of **Vaucanson Silk Mills, Inc.,** Port Jervis, N. Y. The Circle firm has also taken over the 77,000 sq ft plant of the recently closed Modern Central Dyers & Finishers, Inc., where the new screen print division will be operated. Tom Dudko will be in charge.

Gibbs Underwear Company has sold its five-story plant in Philadelphia and has transferred all the machinery to the Lincolnton, N. C., plant.

A. D. Juilliard & Co., a division of United Merchants & Manufacturers, Inc., has ceased manufacturing fabric. The firm has closed its headquarters at 1407 Broadway. The parent company plans to retain the Juilliard name and corporate structure.

James Lees and Sons Co. held an open house recently at its Glasgow, Va., plant commemorating its 25th anniversary of carpet manufacturing operations.

A new firm, **Fiber Associates, Inc.,** has applied for a charter in Easley, S. C. The firm will engage in research and experimentation of fibers, chemicals, and equipment for the synthetic textile industry.

The newly-opened finishing and laminating plant of **American Laminating & Finishing Corp.,** and **Crest Finishing Corp.,** located at 5 North 15th Street, Greenpoint, Brooklyn, N. Y., is now in production.

The Recreational Association of **Cone Mills Corp.** is now operating a cloth shop from which employees and members of their families may purchase Cone fabrics and towels. Any profits made by the cloth store will be used for the Cone Mills employee recreation program.

Wexler Knitting Mills has completed the move from downtown Philadelphia to Allegheny Industrial Center in the north of the city. The

For further information use Handy Return Card, Page 191

TEXACO'S "STOP LOSS" PROGRAM quickly solves lubrication problems that spoil your profit.

Texaco's "Stop Loss" Program can help you stop profits from creeping away

Oil on the roving! Downtime piles up as you find and correct the trouble—and profits creep away.

Texaco's "Stop Loss" Program can help you eliminate losses due to oil soilage and other causes—*add as much as 4% to your net profit.* It's a completely flexible program and it works in large mills and small.

A "Stop Loss" Program begins with a study of your mill's lubrication requirements—from pickers to looms. This is followed-up with recommendations for a lubrication control system fitted to your mill's needs. Then Texaco provides the basic "tools" needed to make "Stop Loss" work for you.

"Stop Loss" can save money in your mill. See how—by sending for more information. And ask to see our new film, "Stop Loss with Organized Lubrication", which dramatically presents new opportunities for savings. Just mail the coupon below today.

TEXACO

Throughout the United States
Canada • Latin America • West Africa

TEXACO INC., Dept. TI-52
135 East 42nd Street
New York 17, N.Y.

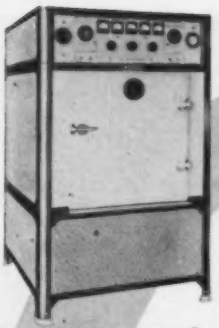
I'd like more information on Texaco's new program "Stop Loss with Organized Lubrication".

Name_____ Title_____

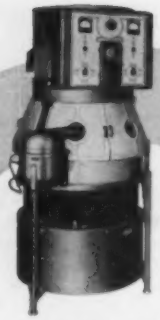
Firm_____

Street_____

City_____ Zone_____ State_____



WEATHER-OMETER®
Reduces years of the deteriorating effects of outdoor exposure to sunlight, rain and thermal shock to a short laboratory test. Priced $2735.00 up.



FADE-OMETER®
Simulates exposure to Sunlight with controlled humidity in alternate cycles of light and dark, producing a quick accurate test of fading qualities. Price $1350.00 up.

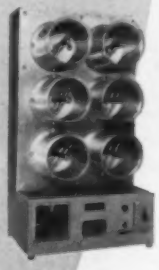
LAUNDER-OMETER®
The standard test machine of the A.A.T.C.C. for determining the color fastness, shrinking, washing and dry cleaning qualities of textiles. Price $875.00.

Atlas-Ometers

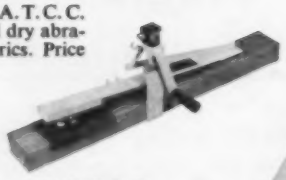
Used all over the world for accelerated testing of textiles and dyestuffs, for colorfastness and wearing characteristics due to light, washing, weathering, abrasion, perspiration, etc. Required in many A.A.T.C.C. and A.S.T.M. test programs and Government specifications.

ATLAS ELECTRIC DEVICES CO.
4114 N. Ravenswood Ave.
Chicago 13, Illinois, U.S.A.

ACCELEROTOR®
Developed by the A.A.T.C.C. for evaluating wet and dry abrasion resistance of fabrics. Price $485.00.

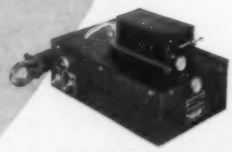


RANDOM TUMBLE PILLING TESTER
For the fast determining of the pilling and fuzzing characteristics of all types of fabrics. Price $485.00 to $890.00.

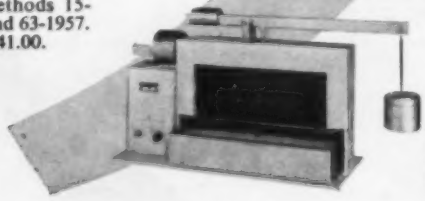


A.A.T.C.C. CROCKMETER
For determination of color fastness to crocking. $42.50 to $55.00.

PERSPIRATION TESTER
For testing color fastness to perspiration and water. A.A.T.C.C. test methods 15-1960 and 63-1957. Price $41.00.



SCORCH TESTER
Standard A.A.T.C.C. tester for damage caused by retained chlorine in fabrics. Price $230.00.



LABORATORY WRINGER and PADDER
For extracting controlled amounts of liquids to produce test specimens as required by many textile test programs. $255.00.

MILL NOTES

(from page 36)

new location affords 5,000 sq ft additional floor space, and operations are all on one floor.

Girard Knitting Mills, Philadelphia, Pa., has ceased operations and is in the process of liquidation.

Bruck Mills, Ltd., Montreal, Canada, has announced plans to enter the knit fabrics market. Some knitting equipment has been acquired and the firm expects to start production of its Brucknit line about the first of November.

The Kendall Company has purchased **J. W. Wood Elastic Web Co.** One of the plants is located in Stoughton, Mass., the other plants are in South Easton, Mass., and Shelby, N. C. The newly acquired business will be operated as a subsidiary of the parent firm with no change in personnel.

Mount Vernon Mills, Inc., has announced acquisition of the papermaker and dryer felt operations of **William E. Hooper & Sons Co.,** Baltimore, Maryland, and has established William E. Hooper Sales Co. as a division of the parent firm. • • • The company has also established a department for research and development. E. H. A. Grassi, vice-president, will have responsibility for the new division.

Seneca Knitting Mills Co., Inc., Seneca Falls, N. Y., has announced the addition of king-size athletic socks to their line, made in sizes 14, 15, and 16.

Fulton Cotton Mills, Atlanta, Ga., has announced the completion of another phase in its modernization program. All warp and filling spinning has been located on the second and fifth floors of Mill 1. Two new multicylinder drying sections have been installed on slashers to replace the old box pressure steam drying cans, and all slashing operations have been moved to the second floor of Mill 2.

Lowndes Products, Inc., has announced the purchase of the nonwoven fabrics equipment of Avondale Mills, which is now set up and producing in the Philadelphia plant of the former company. Initial production includes rayon and nylon fibers, both acrylic or rubber bonded.

For further information use Handy Return Card, Page 191

WE PAY 'EM...THEY WORK FOR YOU!

You may not know it, but you have five full time textile specialists on your staff whose names don't appear on your payroll.

These are George Dockray, Frank Guest, Jess Ellington, Stan Suchecki and Milt May . . . the editors of TEXTILE INDUSTRIES. All textile engineers with mill experience, they travel constantly and interview thousands of mill men each year.

The result is that each month they place a magazine on your desk which is literally a gold mine of management and engineering ideas. It's like having five more full time men on your staff.

TEXTILE INDUSTRIES, 1760 PEACHTREE RD., N.W., ATLANTA 9, GA.

MILL NOTES

(from page 38)

Use of other fibers and binders is anticipated.

A new two-story office building is being constructed for the Textileather division of the **General Tire & Rubber Co.**, Toledo, Ohio. Completion is expected in early December.

Rich-Flex Mfg. Corp., Central Falls, R. I., has purchased the No. 1 building of the Sayles Finishing Plants, Inc., which was closed the first of the year.

The **Orr-Lyons Mills**, Anderson, S. C., a division of M. Lowenstein & Sons, recently sponsored a dinner for approximately 50 students in the textile vocational department at Boys High School. The students were enrolled this past year in classes in carding, spinning, and weaving. The students take carding and spinning the first two years in school, and the seniors take the course in weaving.

Wyndmoor Knitting Mills, Inc., Elizabeth, N. J., and **Rockville Processing Co., Inc.**, Rockville, Conn., have been licensed by Reeves Brothers, Inc., to carry out the patented heat laminating process of the latter firm and to use the trademark "Curonized" when the lamination has been made with Curon foam.

Employment awards were presented to 259 employees of **Russell Manufacturing Co.** at exercises held recently in Alexander City, Ala. which represented a collective total of 4395 years of service with the company. Specifically, two employees received 40-year pins, 12 received 30-year pins; 49 were given 25-year pins; 77 were presented 20-year pins; and 119 received 10-year emblems.

The new 20,000 sq ft plant of Arfa Mills, Inc., has been completed. Located in North Caldwell, N. J., and designated **Arfa Manufacturing, Inc.**, the facility is equipped with a complete testing laboratory and will specialize in the manufacture of elastic fabrics.

PERSONAL NOTES

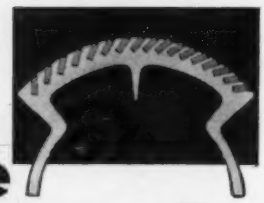
The National Academy of Sciences —National Research Council has announced the appointment of two new members to the Committee on Textile Functional Finishing, which assists in the development of specialized textile finishes to meet military requirements. They are: **Dr. Edward L. Kropa** (chairman), chief chemical consultant of the Battelle Memorial Institute, Columbus, Ohio; Dr. Kropa specializes in the development of new resins and polymers for industrial applications and the physical and chemical aspects of thermoplastics; **Kenneth H. Barnard**, a consultant chemist of Barnstable, Mass., who will contribute his knowledge of the chemistry of resins and textile finishes.

Dan Hurst, formerly in charge of manufacturing and production at the Dalton and Royston (Ga.) plants of Candlewick Yarn Mills, Inc., has been named vice-president of manufacturing.

Alfred W. Cavedon, president of The Aldon Spinning Mills Corp., has been elected president of the People's Savings Bank of Rockville, Conn.

Thomas A. Nash has accepted the

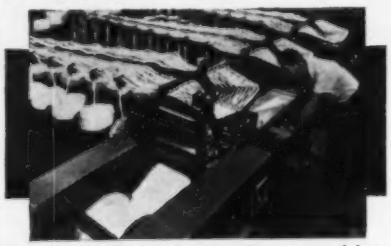
Continued on page 44



the Super J Comber's "RUNNING MATES!"

The Even-Draft High Speed Drawing Frame plays an outstanding part in the Whitin system for the unsurpassed processing of either carded or combed sliver. It is equally effective for the pre-combing or post-combing operation.

The Whitin Even-Draft operates at speeds up to 600 ft. per minute on carded stock (or 450 ft. on combed), producing sliver characterized by its evenness and uniformity.



The Whitin Super Lap machine offers a completely new concept in the preparation of Comber laps, effectively superseding all earlier lap forming techniques.

This most unusual new machine processes laps of superior quality from either 48 or 60 ends of drawn sliver, with weights of up to 1200 grs./yd.

Its production capacity is approximately 500 lbs. per hour, turning out laps weighing 35 lbs.

WHITIN

For further information use Handy Return Card, Page 191

NOW!

get up to 20% more production

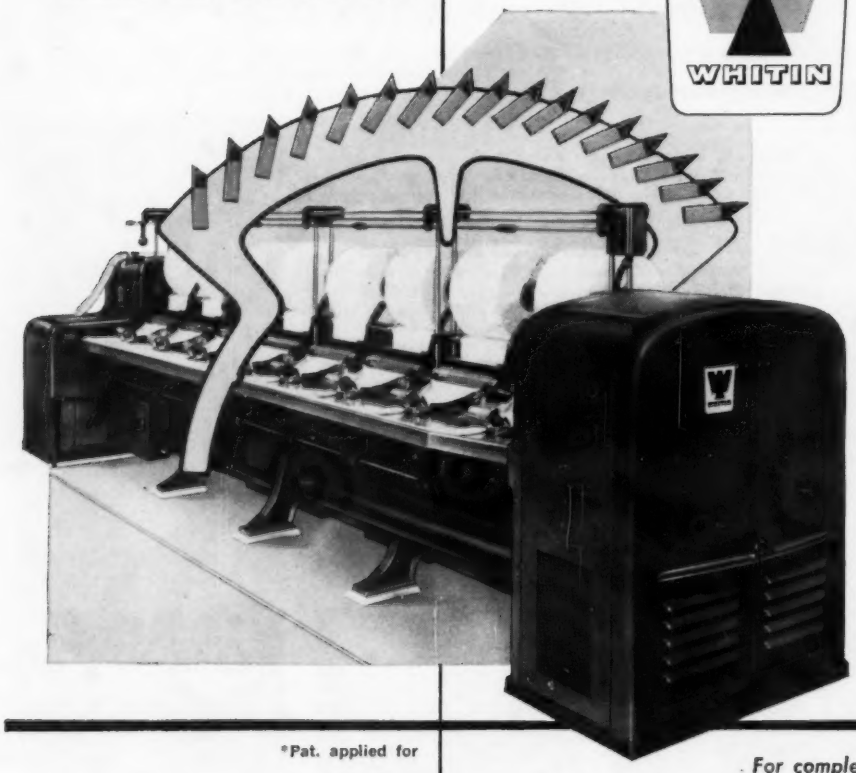
with the WHITIN Super J Comber

and the brand new "GOLDEN CIRCLE"* HALF LAPS

Get full-needle lap penetration and excellent quality combing using 1200 grain laps.

The Whitin Super "J" Comber has already earned an international reputation for its high production and trouble-free performance — but now, with the brand new Golden Circle Half Lap, its production potential is greater than ever.

The Golden Circle Half Lap is the patented product of Whitin research — an extensive research effort "zeroed in" on one objective only, to design and produce a half lap to excel all others in the "quality" combing of heavy grain laps. On Model J5 and J6 Combers, the Golden Circle Half Lap offers you:



SPECIAL FEATURES . . .

- **Full-needle lap penetration.**
- **Lap processing up to 1200 grains.**
- **Anodized aluminum construction — lighter and stronger.**
- **Needle strips bonded in slots for greater rigidity.**
- **Progressive row needle spacing reduces plucking.**
- **Runs cleaner — stays cleaner.**
- **Consistent and better nep removal.**
- **Contoured for better air flow in piecing zone.**
- **Reduced brush wear.**

*Pat. applied for

For complete information ask your Whitin representative or write direct to us.

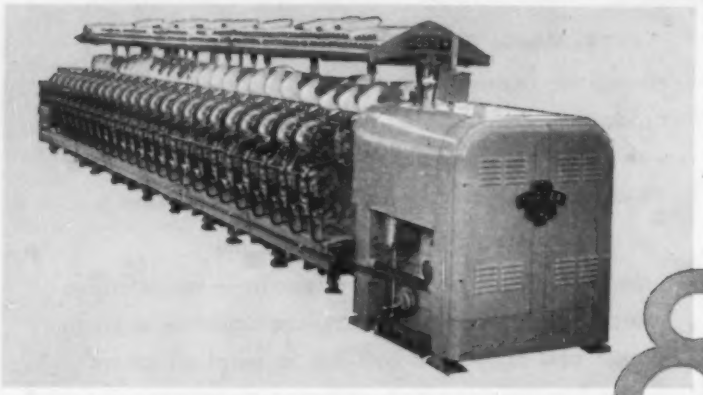
WHITIN MACHINE WORKS

WHITINSVILLE • MASSACHUSETTS

CHARLOTTE, N. C. • GREENSBORO, N. C. • ATLANTA, GA. • SPARTANBURG, S. C. • DEXTER, ME.

The best way to better yarns

FOSTER MODEL 506 AUTOMATIC YARN WINDER



It's New!

It's Available

NOW!

IT BENEFITS YOU IN THESE 8 WAYS!

1. Increases operator productivity by 50%.*
2. Winds at twice the speed of our manual winder.
3. Requires less floor space than our manual winder.
4. Prevents wild yarn (butterflies), tangles, bobbin rings, crossed ends, uneven package density and rough yarn.
5. Eliminates gauging of package diameter by hand.
6. Winds any type of open wind putup, including a steep taper (9° 36') knitting cone.
7. The Model 506 cone is an even better package than the Model 102 cone (standard for the sales yarn market for many years), partly due to electronic tension.
8. Investment required is no more than for our manual winders with same capacity.

*Substantiated and documented in mill tests, under production conditions.

AUTOMATIC FEATURES

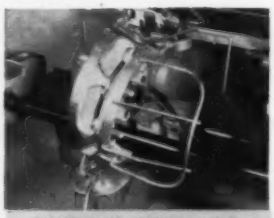
Only those operations which will *not* endanger yarn or package quality have been automated. These include threading up, slubbing and cleaning, disposal of empty bobbins, gauging full cones, donning full bobbins and doffing empty bobbins.

SIMPLIFICATION & SPEEDING UP OF MANUAL OPERATIONS

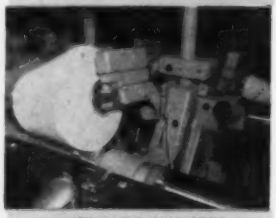
To keep the mill investment required within practical limits and in order to assure top yarn and package quality, which is so vital to sales yarn spinners, donning and doffing of cones, providing bobbin supply and knot tying are still done manually. However, providing the bobbin supply and tying knots have been so simplified that altogether they require only 10/100 of a minute (see illustrations). Wild yarn, tangles, bobbin rings, crossed ends, uneven package density and rough yarn (which are unavoidable at times with automatic knot tying) are definitely prevented on the Foster Model 506.

SEND FOR MODEL 506 BROCHURE

If you are interested in increasing the productivity of your winder operators by 50% in less floor space than you now require; if you are interested in doing this *without* jeopardizing yarn and package quality, find out more about the Foster Model 506 Automatic Winder — send for our brochure, "The Practical Road to Automatic Winding", or ask us to send a representative to talk with you. No obligations.



ELECTRONIC TENSION AND SLUB CATCHER



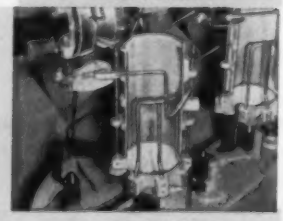
AUTOMATIC SIZE STOP MECHANISM

MANUAL OPERATIONS WHICH TAKE ONLY 10/100 OF A MINUTE AND PROTECT YARN QUALITY

DROPPING BOBBIN IN CHUTE

TYING KNOT WITH HIGH SPEED INSTRUMENT AND TESTING — ALL WITH LEFT HAND

RESTARTING SPINDLE WITH RIGHT HAND



AUTOMATIC SUPPLY BOBBIN EXCHANGER

211-1

FOSTER MACHINE COMPANY

A YARN WINDER FOR EVERY PURPOSE

Westfield, Massachusetts, U. S. A.

Member of American Textile Machinery Association

SOUTHERN BRANCH — Route 85, Belmont, N. C. • CANADIAN REPRESENTATIVE — Ross Whitehead & Co., Ltd., 2015 Mountain St., Montreal, Que. and 100 Dixie Plaza, Port Credit, Ontario • EUROPEAN REPRESENTATIVE — Muschamp Textile Machinery (Sales) Limited, Eider Works, Wellington Road, Ashton-under-Lyne, Lancashire, England • REPRESENTATIVE IN MEXICO — Carlos Rios Pruneda, Av. Juarez No. 145 Desp. 17, Mexico I.D.F.

For further information use Handy Return Card, Page 191

Sticking troubles on your slasher cans?

We have the warp size which will stop your sticking; you will also get maximum weaving efficiency.

Whether you are weaving cottons or rayons, spun synthetics or blends, acetates or filaments, we can handle your problem.

Phone the SEYCO man. Collect!

Stopping slasher sticking is only one of the things the SEYCO man is expert on.

He has the background of over a half century of experience in working on slashing problems . . .

(How many of you remember when SEYCO was called "Sizol"?)

Warp Sizing: *Softeners, Binders, Penetrants, Ty-In Penetrants, Shuttle Dressing, Waxes.*

Wet Processing Chemicals and Auxiliaries: *Dye Assistants, Penetrants, Rewetting Agents, Sanforized Fabric Oils, Detergents, Scouring Agents, Softeners.*

Niagara Twist-Setter: *Yarn Conditioning Penetrants.*

Seyco Warp Lubricator.

Headquarters for textile chemicals

SEYDEL-WOOLLEY & CO.

748 RICE STREET, ATLANTA, GEORGIA

SEYCO

This man is developing 16 tons of pressure to make smoother, stronger joints

Sixteen tons of pressure, developed by this man through use of a Clipper lacer embeds hooks firmly and securely . . . to make a joint as durable as the pieces you are joining. It embeds the hooks flush with the surface and with all strain distributed evenly across the complete joint. The Clipper machine method of making joints is the fastest available. In one easy operation, durable, flexible joints up to 12 inches wide connecting pieces from 1/16 inch to 13/32 inch thick are completed by Clipper. Whenever you have a problem of making two pieces one — Check with Clipper.

For more information— *Detailed product information and case history examples of Clipper machine-lacing benefits are contained in Bulletin No. 157. Send for your free copy today.*

Ask your Industrial Distributor for Clipper Products

Clipper BELT LACER COMPANY

980 Front Ave., N. W., Grand Rapids 2, Michigan

PERSONAL NOTES

(from page 40)

position of personnel manager at the Pelzer, S. C., plants of The Kendall Co., succeeding **H. M. Burrell** who has been transferred to the Bethune, S. C., facility.

Stephen P. De Mallie, formerly assistant to the president of Callaway Mills, Inc., has been named to the newly created position of market analyst for Greenwood Mills, Inc.

John E. O'Sullivan has been elected executive vice-president of

Mr. O'Sullivan

Indian Head Mills, Inc. **James J. Gavin, Jr.,** has been appointed vice-president and treasurer to succeed Mr. O'Sullivan.

Kimberly-Stevens Corp. has announced that upon completion of the modernization program of the newly acquired nonwoven fabrics plant in New Milford, Conn., **Carl H. Rowe** will be manager, **J. L. Murray** will be in charge of production, and **C. L. Spraggins** will be technical supervisor.

Brig. Gen. Oliver C. Harvey has been named executive director of the Military Clothing and Textile Supply Agency, Philadelphia, Pa., succeeding **Maj. Gen. Webster Anderson,** who was recently appointed as The Quartermaster General.

John Columbus Cowan, Jr., vice-chairman of the board of directors of Burlington Industries, Inc., was recently awarded the honorary degree, Doctor of Humanities, by the North Carolina State College. The degree was conferred by **Dr. John T. Caldwell,** State College chancellor, who read the degree citation honoring Mr. Cowan as follows: "Any history of the great textile industry of this state and nation will have to accord a significant place to John Columbus Cowan, Jr. To this industry and to the total civic, educational, and social development of North Carolina

Continued on page 183

For further information use Handy Return Card, Page 191

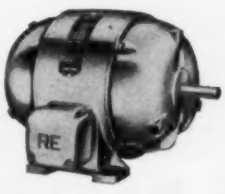
"Molded Horsepower" to fit your equipment

...no longer must you "make something do!"

Just as a famous artist molds each illustration to his need... so, too, can you now have an electric motor exactly tailored to the needs of your equipment. Not just another motor that can be "made to fit" but a complete power package with all desired electrical and mechanical characteristics built right in.

Reuland "Molded Horsepower" is a natural outgrowth of the famous "Xpandable" design idea originated by Reuland many years ago. Through this technique, motors, brakes, fluid couplings, gear reducers and similar devices are available in an almost unlimited number of combinations... all standard units assembled within a single frame and tailored to your specific application.

Only Reuland offers such a wide background of experience in tailored power packages. No wonder Reuland is also the "number one" supplier to many of the top original equipment manufacturers in America!



Our new 8-page catalog, No. GS8-30-0, will come in handy. Sent complete with prices and engineering drawings on request.

MODERN POWER FOR MODERN-DAY PRODUCTS

... all in lightweight, cool-running aluminum frames!

REULAND MOTORS

REULAND ELECTRIC COMPANY
WESTERN DIVISION: *Alhambra, Calif.*
EASTERN DIVISION: *Howell, Mich.*
Distributors in all principal cities

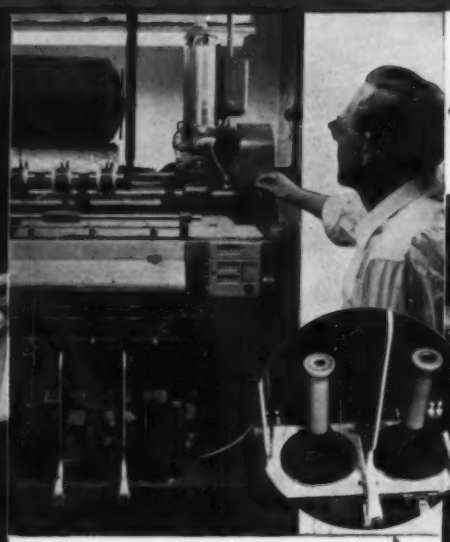
CHARLTON WOOLEN COMPANY USES
CHARLTON CITY, MASS.

HERR "M" TYPE CONICAL RINGS
WITH AUTOMATIC PRESSURE LUBRICATION

For Better Oil distribution (minimum amount)
— on the path of the traveler

No oil scattering
— on the machine to create maintenance problems
— on the yarn to degrade quality

Benefits
LONGER LIFE OF RINGS AND TRAVELERS
HIGHER SPEED OPERATIONS
IMPROVED PRODUCT
REDUCED OPERATING COST



With Herr "M" Type Rings and Controlled Automatic Pressure Lubrication, "YOU DON'T HAVE TO DEPEND ON THE TRAVELER TO SPREAD THE OIL" says Bob Gard.

Bob Gard, who is overseer of spinning, inspects frames that have been in operation for almost three years.

Illustrations show one of the modern installations at Charlton Woolen Company, Charlton City, Mass., manufacturer of coatings and snow suiting fabrics.

Here's how the system operates: Herr "M" type conical rings contain an oil reservoir running completely around the ring. From this reservoir, seams carry the oil by capillary action to the top and side bearing surfaces of the ring so that the paths of the traveler are continuously lubricated... but with a minimum of oil.

The reservoir is supplied with oil by an automatic pressure system that can be set to give just the right amount of oil . . . eliminating troublesome waste.

After the pump cycle has been established, no supervision is needed. Higher speeds and improved products are possible.

Write for complete information

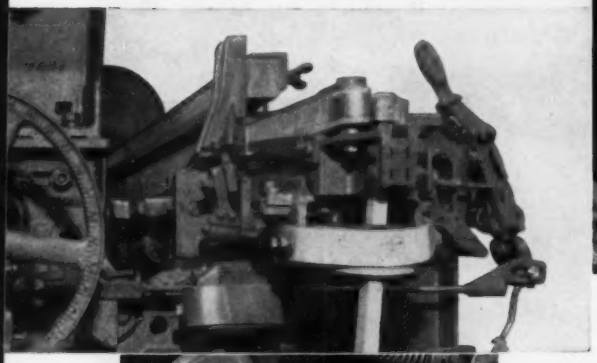
HERR MANUFACTURING CO., INC.
310 FRANKLIN STREET • BUFFALO 2, N.Y.

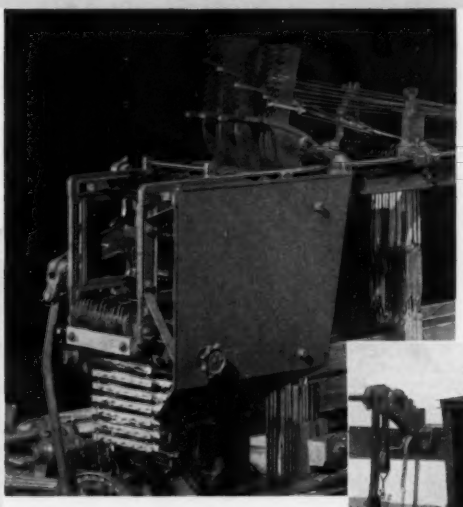
For Spinning and Twisting Worsted • Woolen • Rayon • Nylon • Orlon • Fiberglass and Blended Yarns of all Types

For further information use Handy Return Card, Page 191

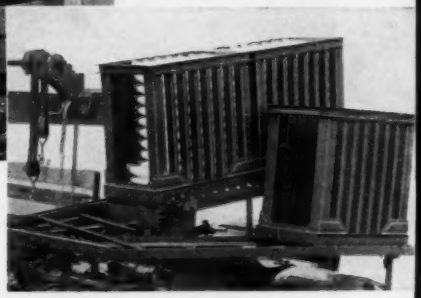
X-3 a new dimension in weaving

ALUMINUM OR WOODEN LAY CONSTRUCTION





TOP MOTION
New strengthened Dobby
— 16 harnesses, 15/32 Gauge or
— 20 harnesses, 3/8 Gauge
Clock Spring up to 6 harnesses



AUTOMATIC FILLING MAGAZINE

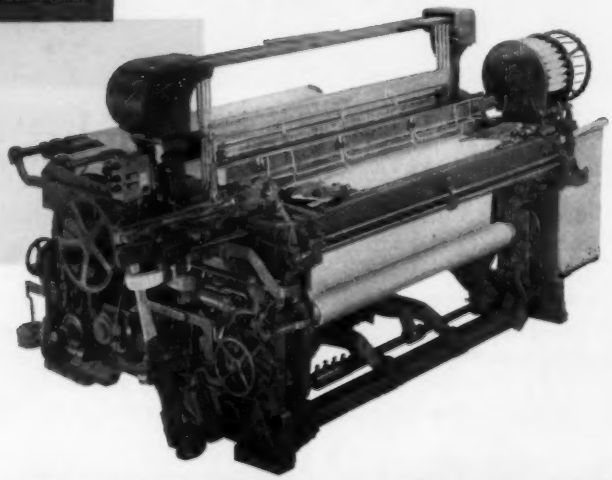
The X-3 Model Loom is designed to weave all of the fabrics normally woven on the X-2 and most synthetic fabrics commonly woven on the XD. This loom provides *greater versatility, increased speed, higher quality goods, and lower weave room costs.*

A weight increase of over 500 pounds in frame and shafting*, contributes to added stability, reduces vibration, and permits higher speeds regardless of fabric being woven.

**As compared with a Draper X-2 Model Loom*

IMPROVED TAKE-UPS
to weave a complete range of Cotton and Synthetic fabrics.

LET - OFFS
Bartlett
Tru-Tension
Hunt



D DRAPER CORPORATION

HOPEDALE, MASS. • ATLANTA, GA. • GREENSBORO, N. C. • SPARTANBURG, S. C.

He's using a tougher yarn...why aren't you?

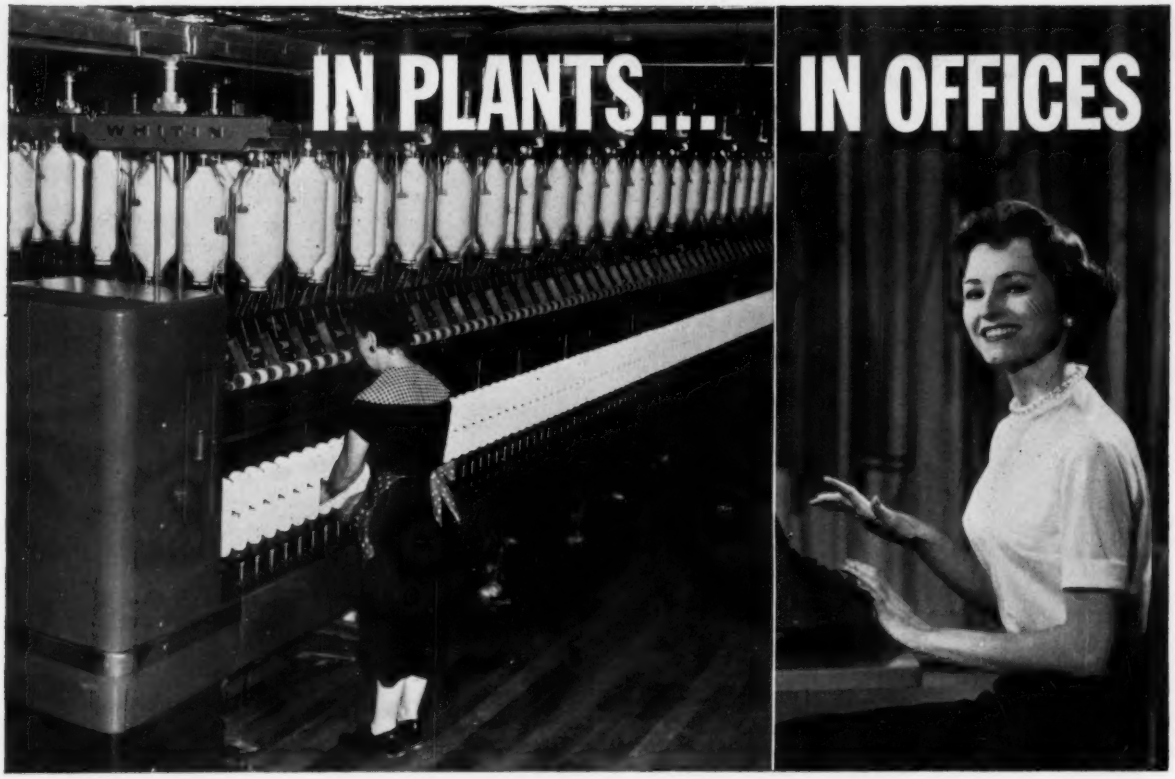
It takes a tough yarn to help a tarpaulin stand up to all kinds of weather. And tough is the word for high-tenacity Golden Caprolan® nylon by Allied Chemical. But Golden Caprolan is more than just tough. It is a remarkably versatile yarn that offers a unique combination of superior performance qualities. Unsurpassed resistance to abrasion, excellent rubber adhesion, greater resistance to flex-fatigue, to name a few. Golden Caprolan established a new standard of strength for marine rope and a new criterion for heat stability in nylon tire cord. Golden Caprolan is also performing superbly in conveyor belts, industrial webbings and dozens of other applications where heavy-duty performance is essential. If you have a tough job, we have the tough yarn for it. Our technical service staffs are ready today to help you.

Allied Chemical

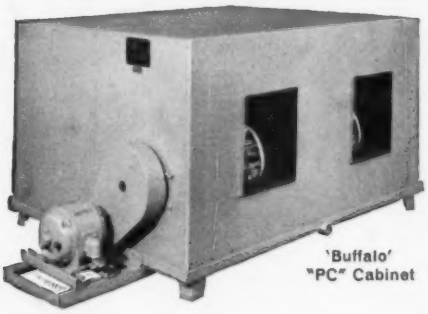
Fiber Marketing Department, 261 Madison Avenue, New York 16, N.Y.

GOLDEN caprolan NYLON FOR THE 60's

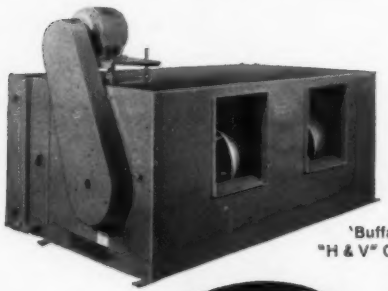
For further information use Handy Return Card, Page 191



'BUFFALO'-CREATED CLIMATES KEEP PEOPLE AND PRODUCTION...HUMMING



'Buffalo'
"PC" Cabinet



'Buffalo'
"H & V" Cabinet

Everything functions better in clean, controlled climates.

People are more efficient.

Machines are more efficient.

And, as you might expect, you get extra years of service from equipment and machinery when dust, temperature, abrasive dirts, and humidity are held in check.

It all adds up to improved quality control and lower production costs. 'Buffalo' air handling equipment will produce these benefits in your plant and offices. 'Buffalo' Heating/Ventilating cabinets are a dependable, year-round source of cooling or heated air. One space-saving unit does the work of two.

Air conditioning problems? 'Buffalo' PC Cabinets cool, heat, humidify, air wash, and filter to requirement. Units illustrated are but two of a complete line of 'Buffalo' air handling equipment. Like *all* Buffalo Forge equipment, each unit is Quality constructed throughout.

"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

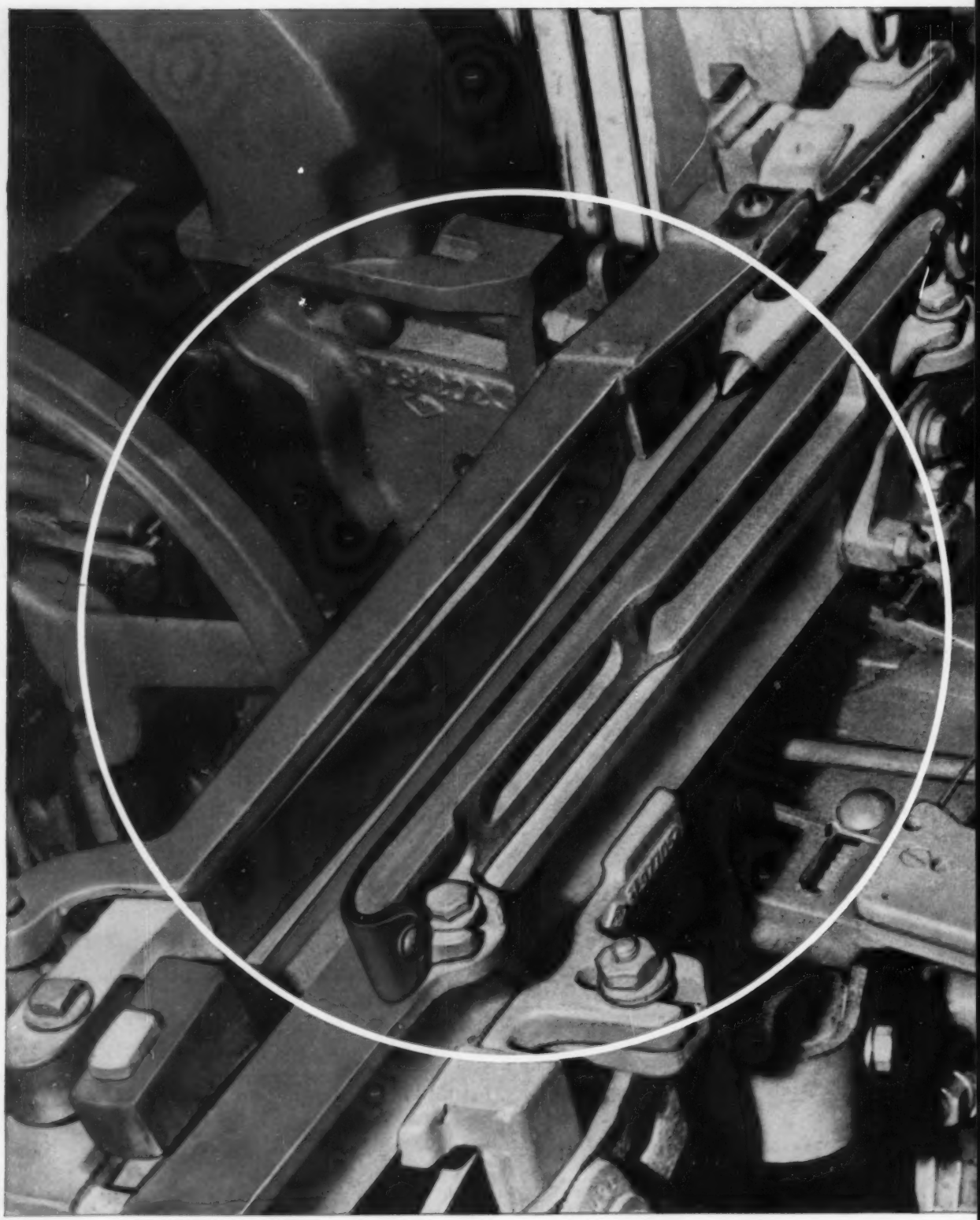
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



For further information use Handy Return Card, Page 191

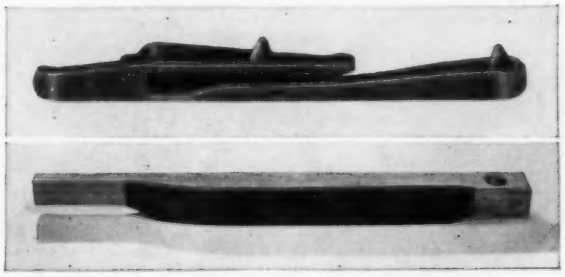
This new Armstrong loom binder covering cuts costly downtime

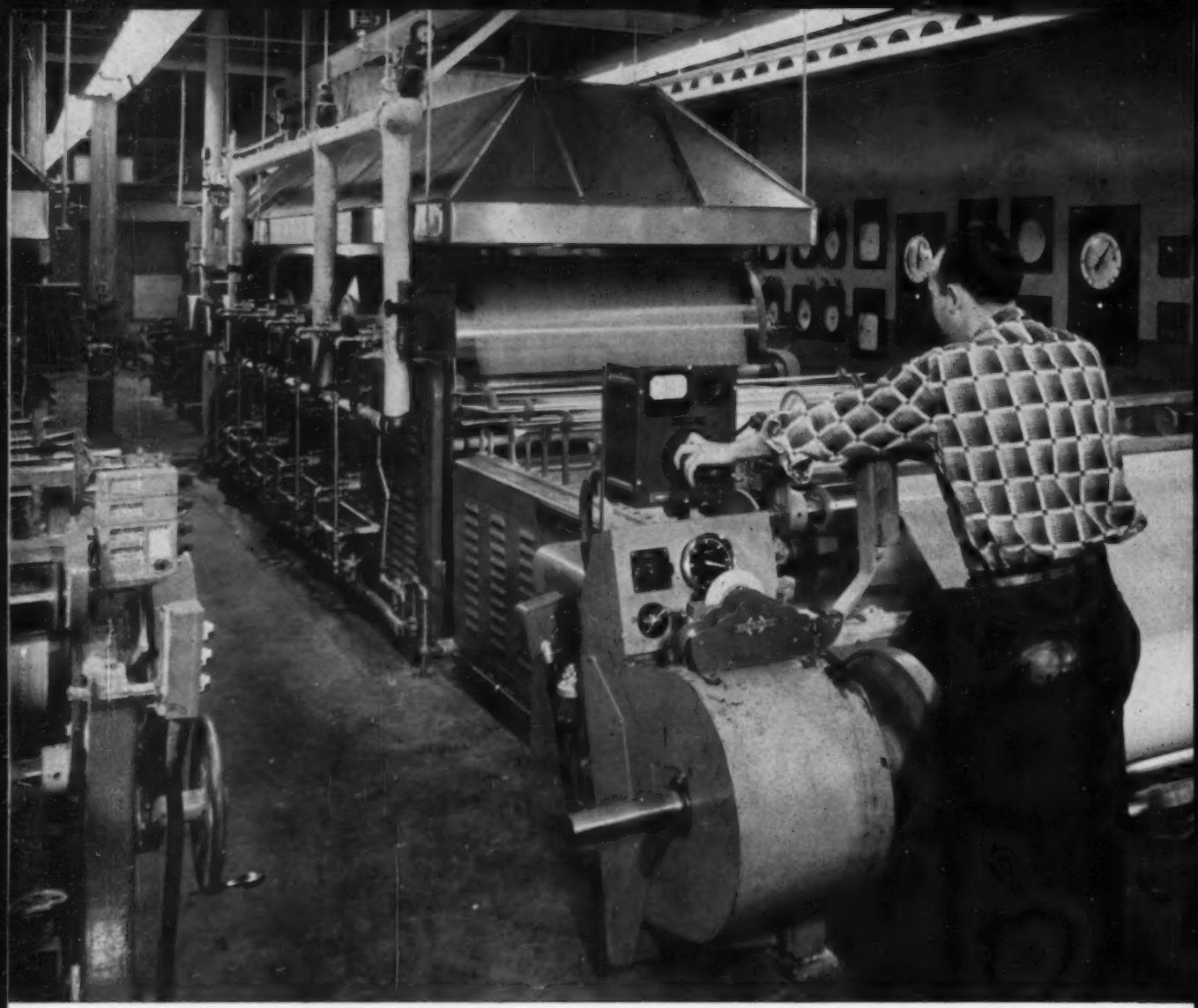
CN-889, Armstrong's new synthetic covering for loom binders and box fronts can help make your weave room more profitable. CN-889 needs less break-in time and requires less resetting than natural materials. And it wears longer, even on looms where heavy plastic shuttles are used. This means that your looms will be shut down fewer times—and for shorter periods—for adjustment and replacement of binder and box front coverings.

CN-889 insures better performance because of its inherent stability. It is unaffected by variations in temperature and humidity that impair the performance of natural materials.

CN-889 gives you all these operating advantages, yet costs no more than other loom binder materials. Interested? Talk to your Armstrong man or write Armstrong Cork Company, 6908 Ivy Street, Lancaster, Pennsylvania.

Armstrong LOOM SUPPLIES





RELIANCE V★S SLASHER DRIVES PUT 25% MORE YARN ON THE BEAM

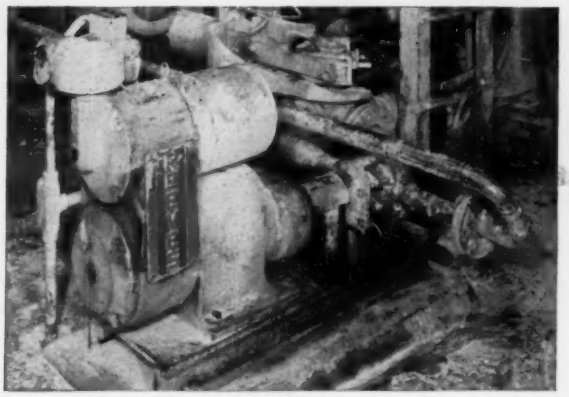
The answer is in precise tension control . . . always uniform from empty to full beam. The result: more yarn on each beam, and fewer beams to tie in. A leading textile mill finds that it can put 25% more fine count cottons on the beam with its Reliance-powered Slasher.

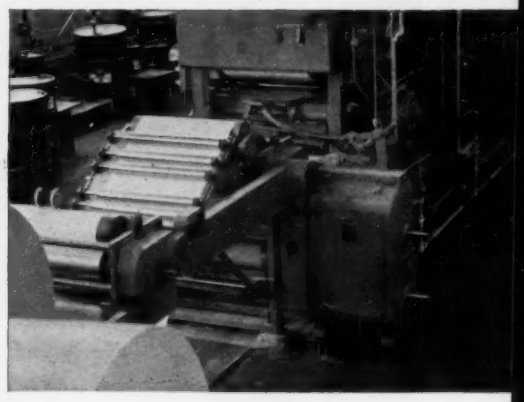
Tension precision extends to a wide range of fabrics . . . and in a wide range of speeds. Reliance V★S Drives maintain this tension during acceleration and deceleration.

Reliance Super 'T' V★S Drives now give you more horsepower in 35% less space, opening up additional usable work areas.

Let your Reliance Sales Engineer tell you about Total Service . . . the coordination of Application Engineering, Start-Up Assistance and Service—to give you complete attention from engineering to maintenance and renewal parts. Check your telephone Yellow Pages, or write or call us direct. A-1666

RELIANCE...builders of the tools of automation



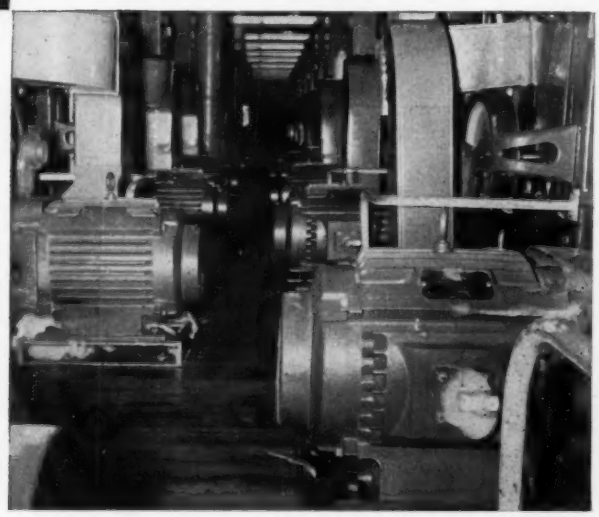


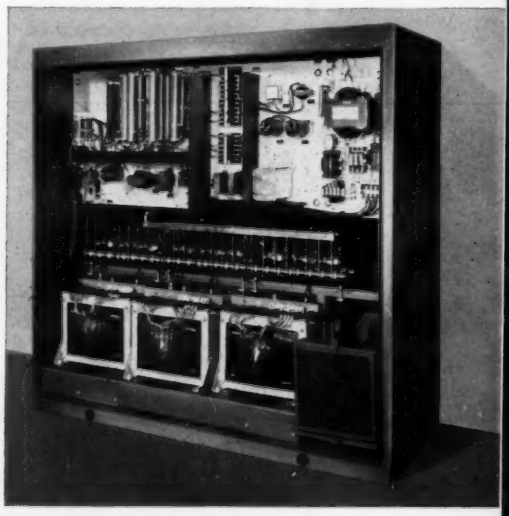
REEVES MOTODRIVE, operating this clay pump in a paper mill, demonstrates its ability to perform under rugged environmental conditions. Use of these mechanical variable speed drives is both economical and practical; they are readily adaptable to remote, manual or automatic process control (Airtrol). Horsepower ratings ¼ to 40; speed variation ranges from 2:1 to 10:1. The many thousands of space-saving assemblies (actually 49,920) mean that practically any application can be made without modification of the standard unit. Catalog G-100.

REEVES TRANSMISSIONS make possible a low-cost means of preserving constant tension on this rotogravure press. You can adjust speeds from any pick-off point of a line shaft either manually or automatically. On Reeves Transmissions, either shaft can be connected to the source of power and used as the constant speed shaft, with the other shaft driven at variable speeds. Drive connections can be any way you want them . . . belt and pulley, chain and sprocket, pinion and gear, multiple V-belt and sheaves, or direct. Bulletin T-497-3.

RELIANCE LINT-PROOF MOTOR. Completely eliminates motor cleaning and motor repairs resulting from lint accumulations. Greatly reduces all motor maintenance by providing a self-contained, completely enclosed unit which requires only infrequent lubrication. This motor is designed for conventional mountings—saves space through under-frame mounting and driving through the fan cover. Now available in 1 through 30 hp. for application on spinning, roving, drawing and twisting frames, as well as on cards, openers, pickers and other textile machines. Bulletin B-2404.

RELIANCE V★S STATATRON is a static-powered drive for wide range variable speed from in-plant a-c. circuits, available from 1 to 200 hp. Instead of a motor-generator set, the Statatron uses silicon diodes and saturable reactors to rectify the current from a-c. to d-c. These work in combination with a transistorized power exciter to supply variable voltage. Statatron is compact—smaller than conventional units. Consists of only three components: Super 'T' D-c. Motor, operator's station and control cabinet. Statatron is quiet—vibrationless, and low in maintenance cost. Bulletin D-2508.





RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 20-8A, CLEVELAND 17, OHIO • Canadian Division: Toronto, Ont.

NEW HONEYWELL TRANSMITTERS

New pneumatic bellows flow transmitter

gives all the economy and convenience of pneumatic transmission and all the efficiency of the bellows meter body with the added option of field indication. The transmitter has 16 ranges (0-10 to 0-400 inches of water) and is used to transmit flow or liquid level measurements in open or closed tanks.

Transmitter Features: Make range changes in the field simply by replacing a single spring assembly. You can adjust damping quickly and accurately while the instrument is in operation. You can install meter with vertical or horizontal piping, so that it vents, drains and purges itself.

New pneumatic temperature transmitter

offers thermal system options with ranges from -125° to 1000°F. Completely new, completely flexible, this transmitter gives you a choice of either mercury or gas actuated thermal system with a wide selection of measuring bulb styles.

Transmitter Features: Mount transmitter on a pipe welded to flow line or on a bracket that clamps to hex head of socket. Vibration resistant thermal system means accurate measurement on vibrating flow lines.

Added Features of both Temperature and Bellows Flow Transmitters include: automatic ambient temperature compensation; two-way overload protection for 100% of span; modular construction for simplified maintenance; self-locking feature to prevent upset; die-cast aluminum case 4″ x 7″ x 9″; available with concentric scale or as non-indicator; transmission accuracy ±0.5% full scale; accuracy of indication ±1% full scale.

For more complete details on the new Temperature and Bellows Flow Transmitters, call your nearby Honeywell field engineer. Or write MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

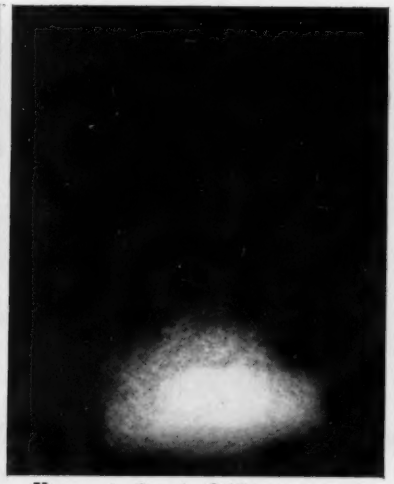
First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

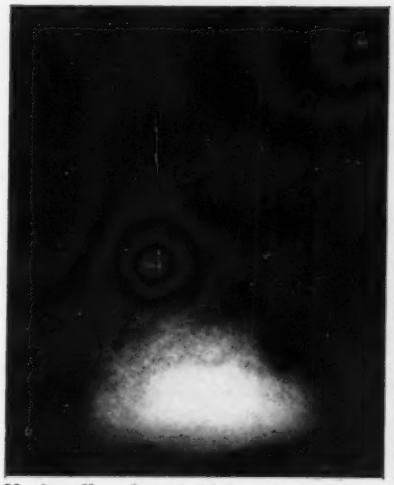
For further information use Handy Return Card, Page 191

This is Acrilan* acrylic fiber.



Known to 9 out of 10 consumers.

Used in over 100 different products.



Nationally advertised for 10 years...

with billions of consumer impressions...

in major newspapers, magazines...

and big-time network television.

Versatile, profit-making ACRILAN!

ACRILAN*

acrylic fiber

*REG. T.M. OF CHEMSTRAND

Chemstrand has licensed this "A"-Acrilan trademark as an ingredient trademark for those fabrications that provide utility, styling and consumer value. In order to obtain a license to use this trademark, the fabrications must meet certain rigid specifications as established by The Chemstrand Corporation.

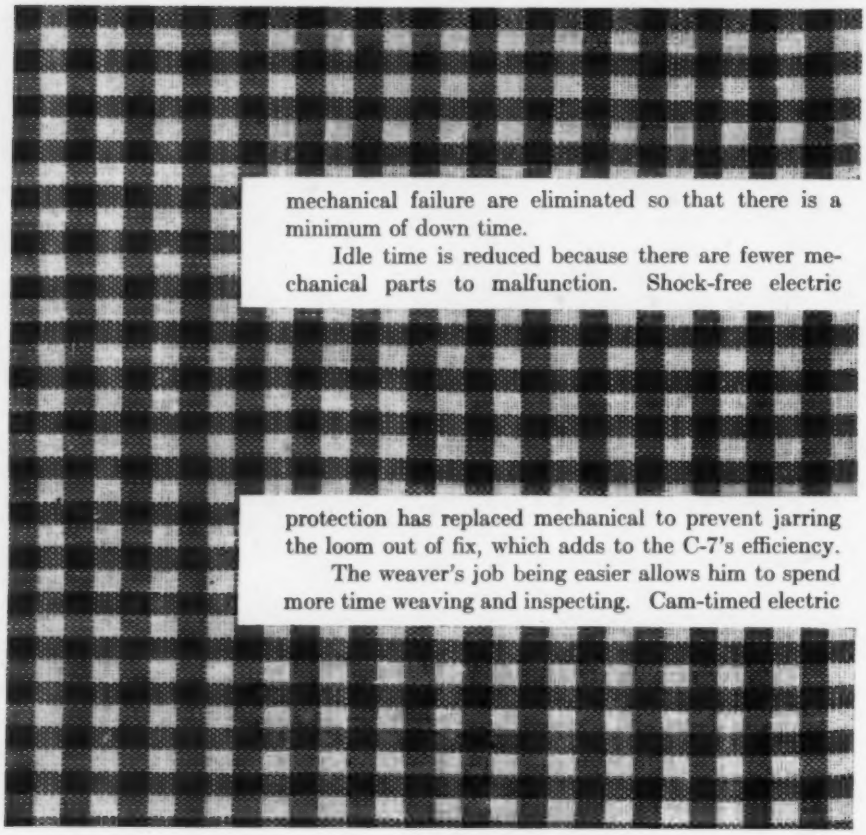
For All Your Needs in '62

THE CHEMSTRAND CORPORATION

Chemstrand makes only the fiber; America's finest mills and manufacturers do the rest.

GENERAL SALES OFFICES: 350 FIFTH AVE., N.Y. 1, N.Y. • DISTRICT SALES OFFICES: 350 Fifth Ave., New York 1; 3½ Overwood Rd., Akron, Ohio; 129 West Trade St., Charlotte, N.C.; Canadian Agency: Fawcett & Co., 34 High Park Blvd., Toronto, Canada • PLANTS: ACRILAN® ACRYLIC FIBER—Decatur, Ala.; CHEMSTRAND® NYLON—Pensacola, Fla.

EFFICIENCY of a loom combined with Speed determines its ultimate Production—the amount of cloth woven in a given time. C&K's C-7 Loom operates with peak efficiency because most causes of yarn and

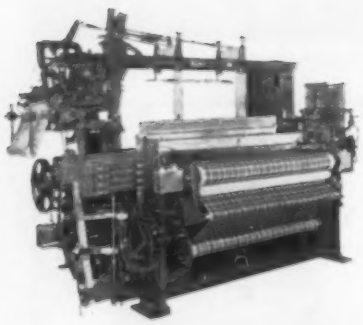


mechanical failure are eliminated so that there is a minimum of down time.

Idle time is reduced because there are fewer mechanical parts to malfunction. Shock-free electric protection has replaced mechanical to prevent jarring the loom out of fix, which adds to the C-7's efficiency.

The weaver's job being easier allows him to spend more time weaving and inspecting. Cam-timed electric controls substitute for many of his skills and efforts. He makes quicker filling and warp break repairs when they occur. Devices such as the automatic lay reversal when the filling breaks save operations he once performed. Single pick control for startups and push button lay reversal after tying in a warp end also increase the weaver's efficiency.

We'd like the opportunity to discuss further how these increases in productivity developed in the C-7 Loom can help reduce *your* cost per yard.



QSEWMT

QUALITY OF CLOTH · SPEED OF LOOM
EFFICIENCY · WEAVER ACCEPTANCE
MAINTENANCE COSTS · TRAINING TIME

CROMPTON & KNOWLES CORPORATION

WORCESTER, MASSACHUSETTS

C&K

WORLD LEADERSHIP IN AUTOMATIC BOX LOOMS - RESEARCH - ENGINEERING - MANUFACTURE

CHARLOTTE, N. C. / ALLENTOWN, PA. / CROMPTON & KNOWLES JACQUARD & SUPPLY CO. PAWTUCKET, R.I. / CROMPTON & KNOWLES OF CANADA, LTD., MONTREAL, QUEBEC

For further information use Handy Return Card, Page 191

Struck oil

No, let's not get carried away. You won't necessarily hit the jackpot simply because you use Du Pont fibers. But we do claim that these are the best-known, most trusted and preferred man-made fibers in the world, bar none. And Du Pont keeps building this preference through a strong advertising program, including network TV, magazines, newspapers, radio... Fibers are just one factor in your operation. An important factor, though. You've a far better chance for far better business when you feature Du Pont fibers on your labels, in your advertising and in your selling plans.

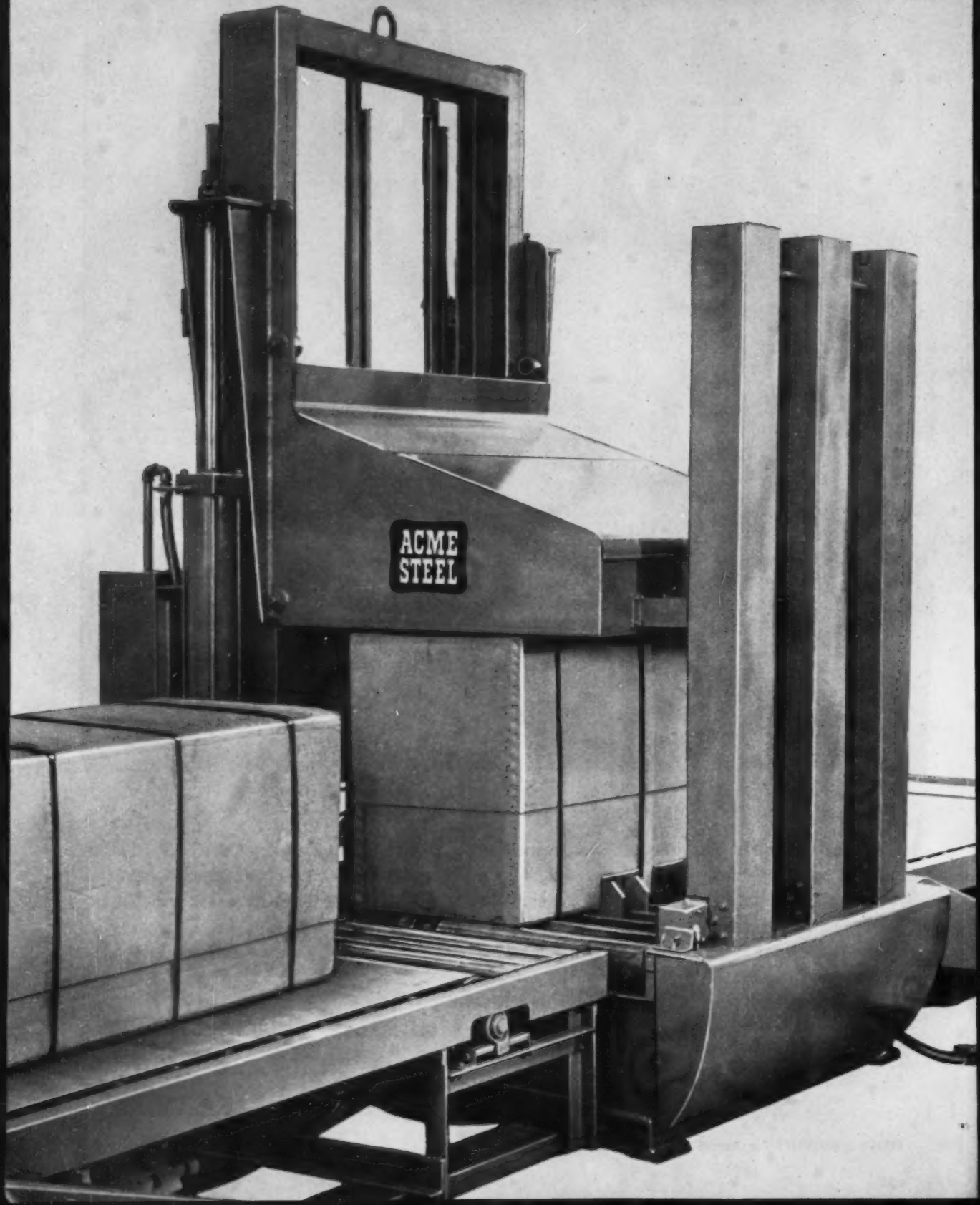
GET A SELLING EDGE WITH NYLON "ORLON"* "DACRON"**

DU PONT
ACRYLIC FIBER
POLYESTER FIBER

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY DU PONT

*Du Pont's registered trademark for its acrylic fiber. **Du Pont's registered trademark for its polyester fiber.

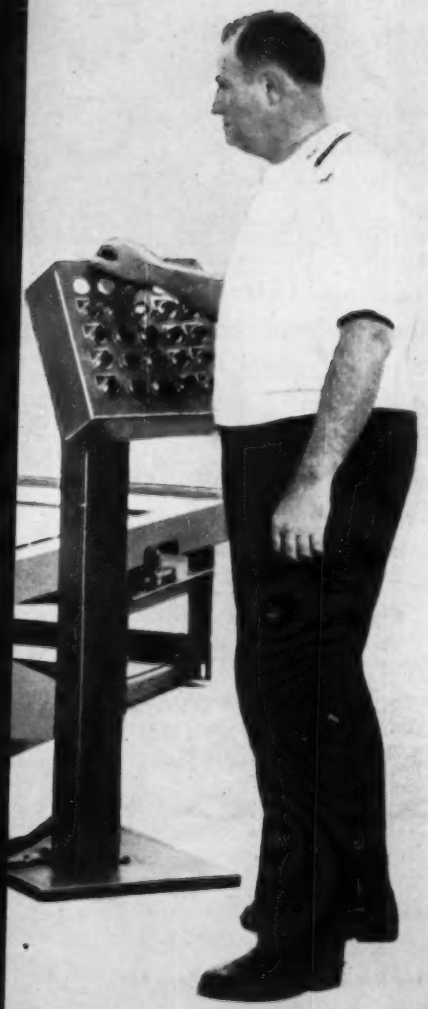
CONVEY 'EM . . . COMPRESS 'EM . . .



STRAP 'EM BY PUSHBUTTON

Four boxes per minute are a pushover with ACME STEEL'S

NEW F11



Here's the speediest line to the shipping platform any textile packager can have. The new Acme Steel F11 lets you command the *complete* box strapping operation automatically:

CONVEY 'EM into the machine on powered rollers by pushbutton.

COMPRESS 'EM with the exact amount of pressure (up to 10,000 pounds) by another touch of the console.

STRAP 'EM automatically—up to three straps at once. All straps are fed completely around the box, then uniformly tensioned, sealed and cut. Clean, convenient pneumatic power does all the work.

Net results: in one minute you can compress and strap four boxes, apply as many as twelve straps. Each box is secured tight and square for faster, safer handling, more stable stacking. And Acme Steel's "customized" compression allows you to pack in the maximum amount of material without squashing!

The revolutionary F11 strapping mechanism is simplicity itself. It requires no complex (and costly to service) electronic circuits. Simplicity has been achieved to such a degree that the entire mechanism can be replaced with a standby in five minutes!

Have your Acme Idea Man explain in full the newest idea in textile compression strapping. And return the coupon to arrange for a viewing of new movie on the amazing F11 in action.

Put pushbutton console where it's handiest. Example: operator weighs completed box while F11 automatically straps the next. Small box in machine demonstrates versatility of the F11.

ACME STEEL IDEA LEADER IN STRAPPING

ACME STEEL COMPANY, Acme Steel Products Division
Dept. TAS-81, 135th Street & Perry Avenue, Chicago 27, Illinois

☐ Please send detailed information on the New F11.

☐ Contact me to arrange for showing of new F11 movie.

Name_____

Title_____

Firm_____

Address_____

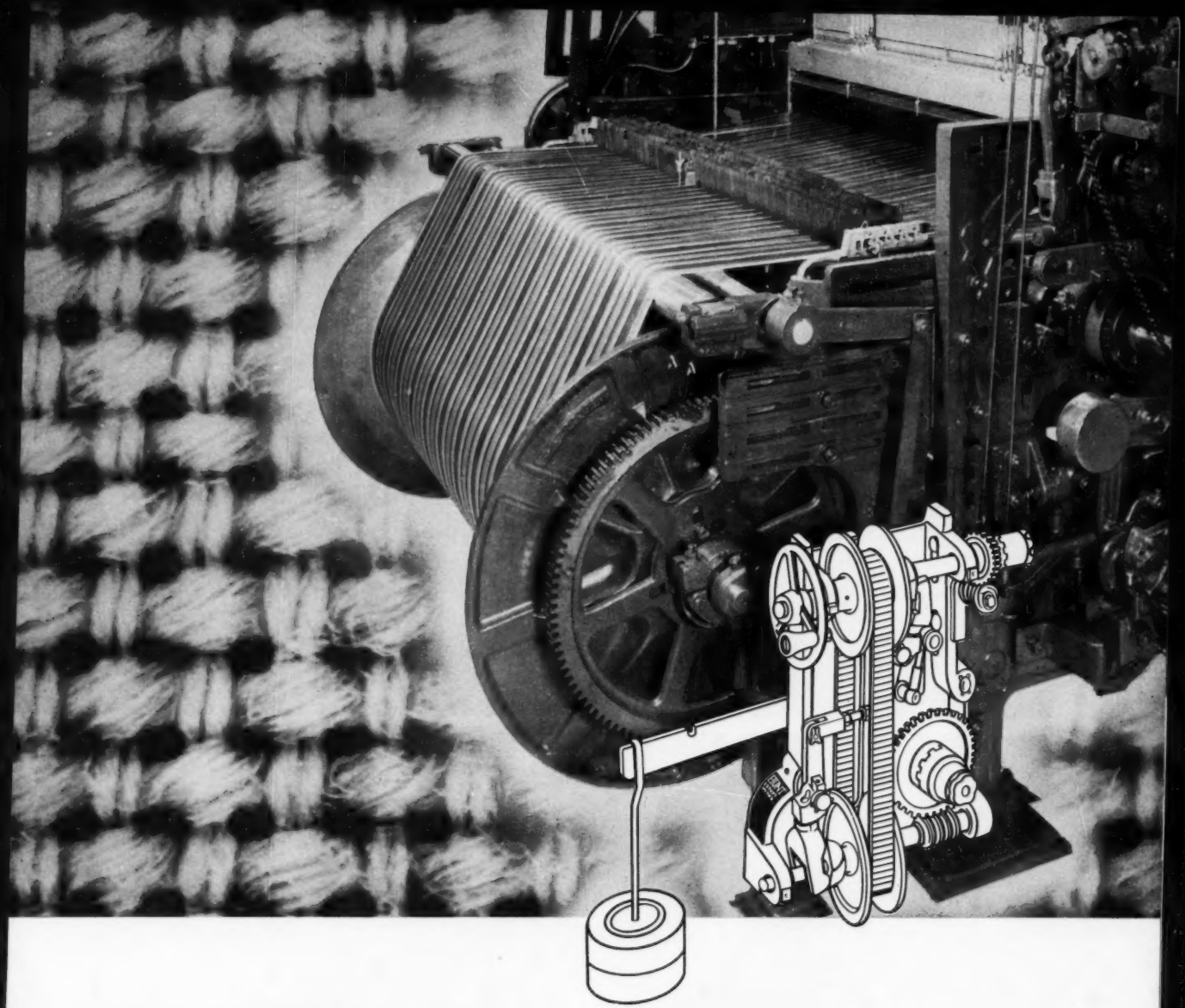
City_____ Zone____ State_____

treasure trove!

Celanese unearths a fabulous museumful of historic fabric designs to inspire magnificent new decorative fabrics for Celanese 1962 home furnishings promotion. From the archives of the Musée De L'Impression Sur Étoffes in Mulhouse, France, come fabrics dating from the time of Marie Antoinette. This collection, the largest of its kind in the world, has been preserved over the centuries, hidden away in the French countryside during the war, reassembled now in the Museum, and brought to light at last by Celanese. The collection includes carefully authenticated documents, historic commemorative fabrics, rare tapestry designs and thousands more—all as yet untouched for commercial use. Celanese has been privileged to take exclusive photographs of these treasures and will make them available to converters for translation into fabrics with Celanese Contemporary Fibers. And we will back these fabrics in '62 with every promotional resource at our command. This promotion is of immediate importance to you. Be sure you're planning a wide range of fabrics with Celanese fibers. There'll be a tremendous demand. And call on our representatives at any time to work with you on new weaves and constructions. Celanese Fibers Company, 522 Fifth Avenue, New York 36 (a division of Celanese Corporation of America). Celanese®

Celanese

For further information use Handy Return Card, Page 191



YOU WILL SELL MORE CLOTH!

You'll Sell More Cloth
When you apply the Hunt Let-Off® to your looms in use or specify it on new C & K or Draper Looms.

You'll Sell More Cloth
Because the Hunt Let-Off eliminates wavy lines and thick-and-thin places that cause the "hungry" look.

You'll Sell More Cloth
Because the Hunt Let-Off does away with set marks due to loom stops to adjust tension.

You'll Sell More Cloth
Because the Hunt Let-Off controls the warp beam on your loom, maintains constant, even tension from full to empty beam. Result: your perfect cloth is measured in miles instead of yards . . . your sales and profits on the rise.

For complete details about the Hunt Let-Off, write, wire or phone for free booklet.

SOMACO®

SOUTHERN MACHINERY COMPANY
Box 3217—Station A • 5806 Augusta Road
Greenville, South Carolina • CRestwood 7-2116

In Europe or India:
Casablancas High Draft Co., Ltd.
Bolton St., Salford 3, Manchester, England

X-7 APRON: a textured surface for finger-tip control of yarn.

X-98 COT: outstanding anti-static properties at top temperatures.

X-35 COT: a positive grip that breaks up surface tension.

New Ingredients and Special Surface Texture Make These Dayco Aprons and Cots Superior

Cash outlay for aprons and cots is but a small part of the cost involved in the spinning operation, yet use of the right apron and cots combination can do much to increase efficiency. Before you place your next order, add to your file of information on superior aprons and cots these facts about the new Dayco X-7 apron . . . Dayco's X-35 and X-98 cots:

FINGER-TIP CONTROL OF FABRICS

Dayco's X-7 apron, readily identified by its pink color and triangle imprint, has, as the micro-photo inset makes clear, an amazing skinlike surface that permits unusual control of fibers of every type. And the X-7 combines with its efficient handling of fibers many other qualities equally important.

It offers exceptionally high resistance to ozone checking as well as lengthwise cracking caused by flex. Its resilience and sturdiness are equally impressive, enabling the Dayco X-7 to meet, fully and satisfactorily, the demands of modern drafting.

POSITIVE GRIP FOR BETTER DRAFTING

Visual inspection of Dayco's X-35 cot, intended primarily for use on the back line, reveals that it contains somewhat finer particles of material than are usually found in cots of medium Shore hardness.

Many such cots, because of their larger cell structure and comparative softness, lack sufficient tensile strength. But Dayco's X-35 does not. While providing a positive grip that breaks up surface tension, it also meets all other standards of fine performance.

NEW INGREDIENTS PERFECTLY COMBINED

Like Dayco's X-7 apron, the X-98 cot, recommended for front-line use, derives its superiority from a new formulation. The anti-static properties retained by the X-98 even at high temperatures deserve special mention. Its durability is also noteworthy, as is the top-quality yarn it helps deliver.

Originally developed to meet the problems of a particular mill experiencing heat build-up, the X-98 is typical of Dayco's approach to customer service. Demand for the X-98, as word of it traveled from mill to mill, has made it an important new item in Dayco's complete line of cots.

GO DAYCO ALL THE WAY

Whether a few, or whether hundreds of thousands of a product are marketed, Dayco research and quality control are constantly at work. A fine field staff stands ready to answer any questions you may have about the suitability of any Dayco product for a given assignment.

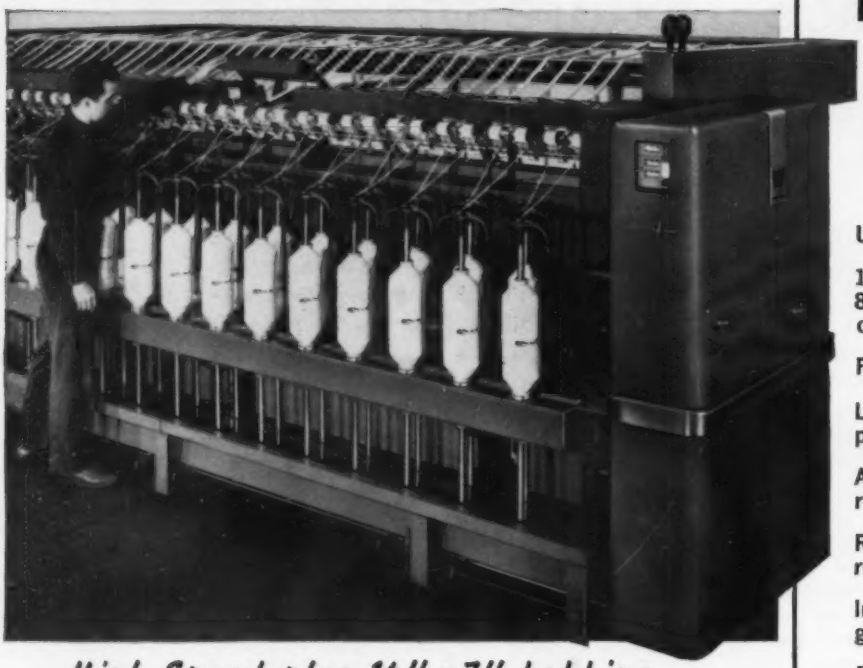
Put the best to work for you in the best possible way, with the help and advice of your Dayco representative! Phone or write Dayco Textile Products, 401 South Carolina National Bank Building, Greenville, S. C.; Overseas plant: Dundee, Scotland.

Dayco TEXTILE PRODUCTS

Dayco

Divison of Dayco Corporation

New WHITIN Model P SHATTERS Roving Production Records



High Speed-plus 14" x 7" bobbins make dramatic increases possible

Trapped in today's cost/price squeeze? Only two things will help — increase your production and cut operating costs — and the great new Whitin Model P Roving Frame does both for you.

The basis of its enormous output is its capacity to build giant 14" x 7" packages carrying 88 oz. or more at very high speeds to give you the production increases you've probably dreamed about, 20%, 30% — even 50% or more.

And these same giant packages also reduce both the frequency of doffing on the roving and of creeling on the spinning, resulting in significant savings in both places.

Just check the list of features, and we're sure you will want to discuss the Model P in more detail with your Whitin Sales Representative.

the Model P offers:

- Up to 1200 rpm flyer speed
- 14" x 7" bobbins carrying 88-100 oz. net, depending on cotton and Hank Roving
- Full length 96 spindle frame
- Less floor space required per pound produced
- Antifriction top and bottom rolls — 3 lines
- Reduced doffing time on roving operation
- Improved and simplified gearing
- Doffs over a bale (500 lbs.) at a time
- Uniform-pressure spring weighting on rails
- Reduced creeling time on spinning
- Permanent mold, aluminum alloy flyers—easily threaded
- Hand and foot operated off-on switches
- Modern broken end and waste collection systems
- Variable speed pulley drive

Why not call him today?

WHITIN MACHINE WORKS

WHITINSVILLE • MASSACHUSETTS

CHARLOTTE, N. C. GREENSBORO, N. C. ATLANTA, GA. SPARTANBURG, S. C.

The best way to better yarns

For further information use Handy Return Card, Page 191

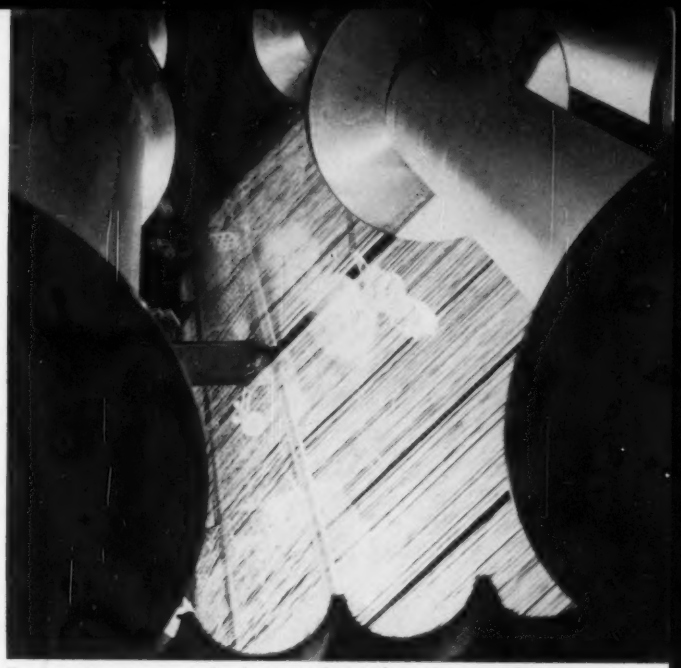
Textile Industries

for August 1961 presents . . .

MAN-MADE FIBERS 1961

A look at the record 65	Printing glass fabrics 84
Woven stretch fabrics 66	Overseas man-made
Wash-wear rayons 71	fiber developments 87
Man-made elastic yarns 75	Multifiber blends 93
Dacron-wool blends 81	Launching a new fiber 97

Edited by J. B. Goldberg, consultant, and the staff of "Textile Industries"



One significant recent development discussed in this special exclusive feature is man-made elastic yarn (page 75). Shown above peering through 1800 hair-like elastic strands of "Lycra" spandex fiber in a flat bed knitting machine at Warner Brothers' Ashaway, R. I., knitting and finishing plant are Gene Wheeler, plant manager, and Ed Berriman, a Du Pont fibers representative.

A look at the record

by J. B. Goldberg
Consultant to the Textile and Allied Industries

Exclusive

Progress in the development of man-made and natural fibers and further improvements which may be achieved

THE MILL man, dyer, and finisher, converter, cutter, and ultimate consumer have undoubtedly encountered unhappy experiences with one or more of the man-made fibers at some time or other. It is easy to understand how such disappointments or difficulties with the shortcomings of the test-tube fibers have blinded many individuals to the remarkable advances which have been made in their relatively short span of life.

A look at the record and reminder of the "good old days" when those babies were too young to speak for themselves may serve to earn some appreciation for the progress which has been achieved in overcoming deficiencies long since forgotten. At the same time, these past accomplishments should inspire us with confidence as we look ahead to the time when further progress will be made in the elimination of many of the present faults. Those who have been associated with the industry for more than 30 years will recall many of the failings and problems in the early days of some of the manufactured fibers, whereas the neophytes may be familiar with the headaches encountered with the newer synthetics only.

Filament Rayon. Rayon, first of the man-made fibers made available in the United States, was originally offered in continuous filament form only. The denier sizes were limited and the individual filaments were fairly coarse. The yarns possessed a high metallic luster, with the result that one automatically identified apparel fabrics of rayon as "that shiny stuff." Hand was likely to be harsh, tenacity was low, both dry and wet, and the dyeing left much to be desired from the standpoint of uniformity from lot to lot.

" . . . one might remark that rayon's black eye came from the shiners, rather than in the usual sequence."

Many of us remember when it did not take much mishandling at the finishing plant to bring about a complete disappearing act on the part of the rayon component, usually confined to the filling yarn in a cotton-warp fabric. Filling "shiners" or tight warp ends due

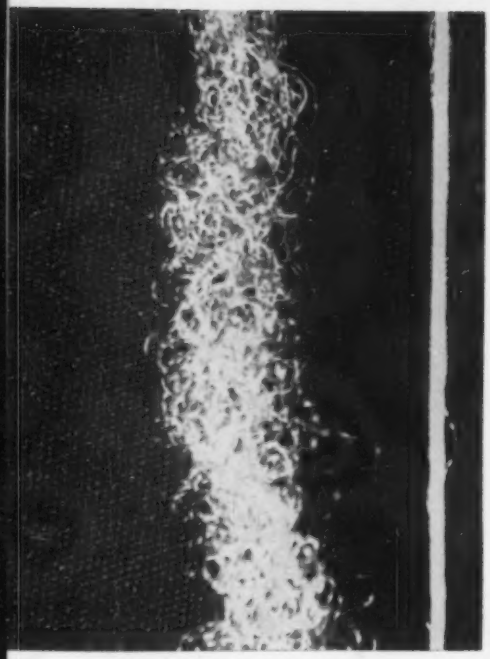
Continued on page 80

WOVEN

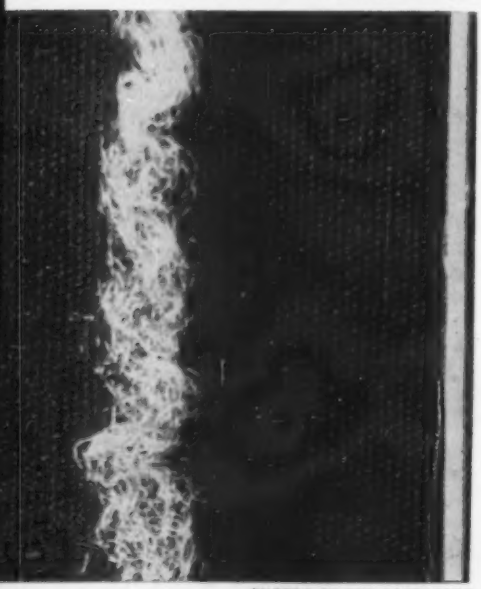
The critical problems you'll meet in designing and finishing woven stretch fabrics

by Stanley M. Suchecki
Associate Editor

Exclusive



A heavy-denier, multifilament nylon yarn, false twisted by the Superloft process, is shown here (top left) as it is beginning to assume the shape in which it had been heated during false twisting. A portion of the same yarn is held in a stretched condition (top right), showing that it resembles an untreated yarn in appearance. Stretch yarns of the conventional and false-twist types can possess a stretch potential of over 300% after relaxation, depending on denier, filament count, and conditions of false twisting. The photograph below shows the decidedly more coiled-like shape of the same false-twist yarn in the top photograph, after relaxation. A portion of the yarn (bottom right) was held under tension while being photographed. If a heat higher than that used in false twisting is applied to the yarn while it is under tension, its stretch characteristics will be completely destroyed.



PHOTOS BY SYD GREENBERG

WITHIN the past year, there has been a sudden awakening of the industry to the opportunities that exist in this country for merchandising woven stretch fabrics. Although the means of building elasticity into fabrics have long been available, through developments in texturizing yarns of man-made fibers, fabric technologists made no serious efforts to evaluate their potential in woven fabrics. The knitting industry, however, has been successfully utilizing these unique developments, including the so-called "stretch" yarns (produced by twisting-heat setting techniques), which can provide varying degrees of stretch with full recovery.

Most woven-fabrics producers viewed this concept of fabric engineering as being either an extreme departure from accepted styling principles, or with an uncertainty about its market acceptance. To be sure, woven stretch fabrics of domestic manufacture have been marketed in this country—even before the present surge of enthusiasm swept the industry. But the volume has been relatively small by comparison with the output of European manufacturers, who began to experiment with stretch and false-twist yarns almost a decade ago. That is not to say that similar experimentation has been lacking in this country; for among fiber producers, throwsters, and machinery manufacturers, development programs have been under way to extend the property of elasticity to woven fabrics. Leesona Corp., and Chemstrand Corp., to name only two firms, began extensive development programs some years ago.

Nevertheless, a cautious attitude prevailed among domestic woven-fabrics producers. Meanwhile, European manufacturers leisurely learned the intricacies of working with stretch yarns. They soon began to design fabrics by newly evolved principles, which achieved a desired degree of stretch in the finished fabric by proper selection of raw materials, twisting-heating conditions, and fabric constructions, to begin with, followed by precise control over "relaxation" and finishing.

So successful has been the European program that over the last three years woven stretch fabrics of sound design and high style began to find increasing acceptance in this country — surprisingly, in markets where price was not of prime importance. It was largely the discovery of this marketing phenomenon that brought on the recent rush of fabric producers into the field.

Stretch yarns: How produced

Thus far, most fabrics have been designed to possess stretch in either a warp or a filling direction although fabrics can be designed to possess a two-directional stretch. End usage determines both the direction and degree of stretch required. Ski-pants fabrics, for example, require stretch in a warp direction; while shirting fabrics require it in a filling direction, and obviously to a much lesser degree.

Precisely what degree of stretch a given fabric should possess is an important problem now facing the industry, and some confusion about it exists among designers, merchandisers, and converters. There has also been some failure

STRETCH

to understand the basic principle by which yarn stretch is originally obtained and subsequently imparted to a fabric from its latent state. It may be worthwhile, then, to review briefly the methods by which stretch yarns are manufactured, and to point out the influence on ultimate fabric stretch of denier, filament count, throwing, post twist, fabric design, and finishing. These are the essential raw materials, tools, and techniques by which a truly infinite variety of fabrics may be designed, defying imitation by even the most skilled throwsters and fabric technologists.

The first method of producing a stretch yarn was developed by the Heberlein & Co., AG of Switzerland. Yarns produced by this method are referred to as conventional-type yarns and are marketed under the Helanca trademark. The method requires the following steps:

1. Inserting between 45 and 125 turns of twist per inch, depending on denier and effect desired (65 to 75 tpi are commonly inserted when processing 70-denier yarn).
2. Heat-setting in a pressure steam box at approximately 260 F for one hour or less.
3. Untwisting yarn through zero.
4. Doubling if required, coning, etc.

The second method of producing a stretch yarn combines twisting, heat-setting, and untwisting into a continuous false-twisting operation, as shown in accompanying threadline diagram of the Superloft process.

Aside from the fact that a quality yarn can be produced by false twisting, its appealing advantage is an economic one. For it is interesting to note that over the last five years the production per spindle has increased enormously. There have been continual increases in spindle revolutions per minute—to a present 350,000 — substantially reducing the investment required per spindle. For these reasons, the false twist method is most commonly used in the U. S.

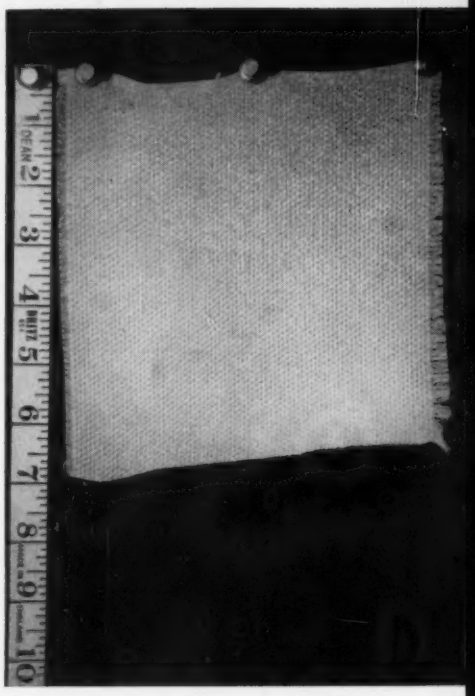
Nylon Is King. Of the man-made fibers which lend themselves to stretch yarn manufacture, nylon is most widely used in this country, though polyesters and acrylics can also be used. The fiber property which imparts stretch characteristics to a yarn, as everyone knows, is thermoplasticity, which allows a yarn to assume the shape given it by twisting under controlled tension and heating at a designated temperature. The temperature of heat-setting varies according to the type of nylon being processed, and of course with the class of fiber, as the following approximate temperatures required in heat-setting indicate:

Nylon 6	360 F
Nylon 66	440 F
Dacron polyester	400 F

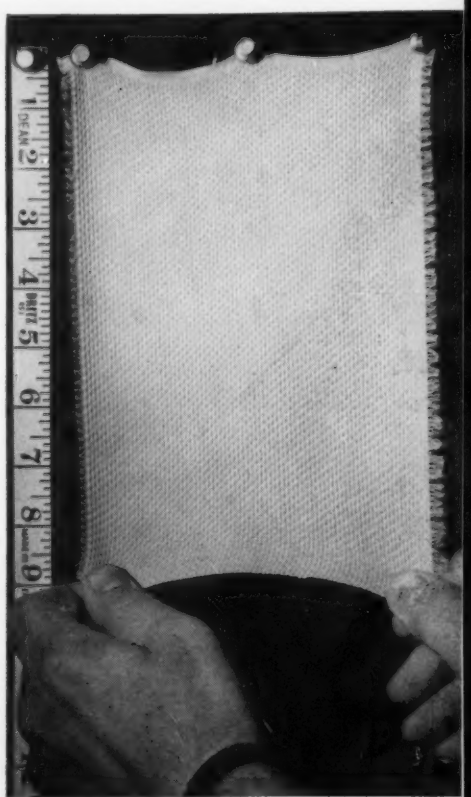
These temperatures have an important significance in finishing (as will be pointed out later) if the heat-setting operation is required, as it normally is when filling stretch fabrics are processed. It is advisable to know which nylon type is being processed for correct adjustment of temperature in heat-setting. (A test to differentiate the two nylon types, incidentally, is a melting point determination.)

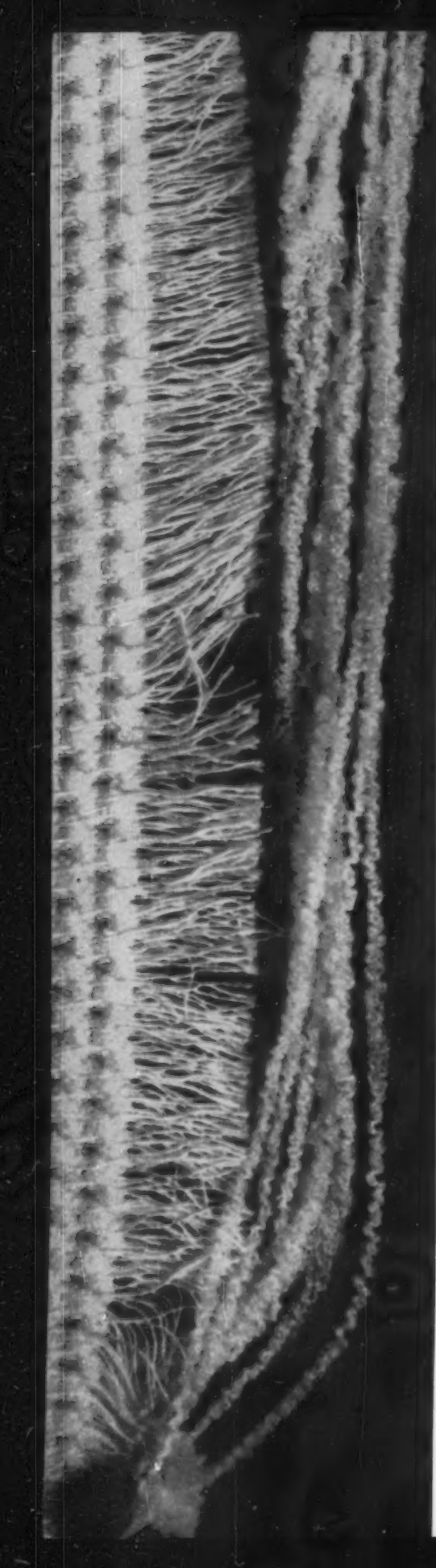
Yarns produced by batch and continuous false-twist methods can possess a stretch potential of over 300%, depending on denier and filament count, to begin with; and upon tension, tpi, and temperature used in processing. A throwster can obtain proper degree of stretch in the yarn by proper modification and control of these variables. And he can further influence the ultimate stretch in fabric by applying a post twist.

Since the false-twisted yarn (and the conventional-type yarn as well) has a tendency to return to its heat-set shape (a shape resembling a coiled spring), it is necessary to ply it with another yarn, similarly



The maximum stretch potential of a fabric can be measured precisely on an Instron tester. But these photographs taken before and after hand stretching show the maximum stretch potential of a filling stretch fabric with reasonable accuracy. The fabric was woven, dyed, and finished at Bradford Durfee College of Technology.





The unraveled filling stretch yarns of the fabric shown on page 67 show a larger diameter, greater bulk, and a coiled-like shape, in comparison with the relatively straight conventional yarns in the warp.

heated but of opposite twist, to obtain what is known as a "balanced" yarn. There are other means of balancing a fabric, but a discussion of these is outside the scope of this article. Fabrics can be designed, however, in which both yarns in the ply possess twist of the same direction, again pointing out that infinite variations are possible in developing fabrics by the stretch fabric concept.

Influence of fabric design

The process by which a stretch yarn develops its maximum stretch potential is known as "relaxation." It is a simple procedure to carry out and can be a useful quality control test. The throwster and weaver can measure stretch potential of a yarn by simply immersing a skein of yarn (of standardized length) in a water bath, maintained at 180 F, for a period of 10 minutes. After the skein has been dried and conditioned under controlled temperature and humidity, its length is measured and compared with an untreated skein of identical manufacture and length. The difference represents the amount of maximum stretch the yarn possesses.

When the yarn is in the woven state—either as a filling or warp yarn—it cannot reach its maximum stretch potential upon relaxation because of the restrictions of fabric design (or more precisely, the number of interlacings), the frictional forces of fibers and yarns working against relaxation, and tensions that may be placed on fabric in finishing. The data in *Table 1* serve to point out the varying restrictions of three common weaves on obtaining maximum stretch potential in a given filling stretch yarn.

These data clearly indicate that as the number of interlacings is reduced (the plain weave has a maximum number of interlacings), the stretch yarn has greater freedom to increase in diameter during relaxation and consequently more area in which to return to its coiled-like shape. Thus, a close relationship between yarn manufacture and fabric designing is clearly indicated to achieve the desired degree of stretch in the fabric after relaxation.

TABLE 1. Effect of Weave on Stretch Potential

	Count, Grey		Count After Boil-Off	
Weave	W*	F**	W	F
Plain	90	90	94	105
2/1	90	90	96	120
Steep twill	90	90	100	135

*40/1 cotton warp
**70/2 stretch nylon filling

But now the influence of dyeing and finishing operations enters into the picture.* If these are not soundly planned and carried out, with particular emphasis placed on controlling tensions and temperatures, the art work of the throwster and designer can be impaired, if not completely destroyed. According to several authorities, the combination of tension and heat, even under normal conditions of processing, tends to alter stretch characteristics—since long dyeing cycles are normally required at high temperatures.

*A discussion of printing is not included in this article.

Equipment: Key to tensionless processing

Two distinct dyeing and finishing routes are indicated for processing stretch fabrics: To process warp stretch fabrics, tension in the warp direction is obviously undesirable. Some tension in a warp direction might be tolerated when processing filling stretch fabrics—but tension in a filling direction, particularly in drying and heat-

setting, must be carefully controlled. For at the temperature of heat-setting (which is higher than that used in yarn processing), the yarns are set in a shape influenced by fabric design and tension. Consequently, each type of stretch fabric requires a different processing route and essentially different pieces of equipment.

The synthetic fabric finishers are best qualified to process fabrics of both types; over the last 20 years they have assembled a diversity of equipment and have acquired the technical know-how essential for processing blends of man-made fibers. The cotton finishing plants are qualified to process filling stretch fabrics by virtue of their facilities. But this does not insure quick success, unless the individual plant has had prior experience in processing blended fabrics, including blends of nylon with other fibers. The cotton finishing plant must above all discard the time-tested, high-speed processing routines, in many of which tensions are applied excessively. For after heat-setting there can be no return to a fabric's original, relaxed dimensions, either by re-framing or by a compressive shrinkage treatment.

In general, the sequence of operations for processing each type of stretch fabric is as set forth below. These operations indicate the type of equipment that is required, and suggest the finesse in handling required to develop maximum stretch potential and to control it to the required degree:

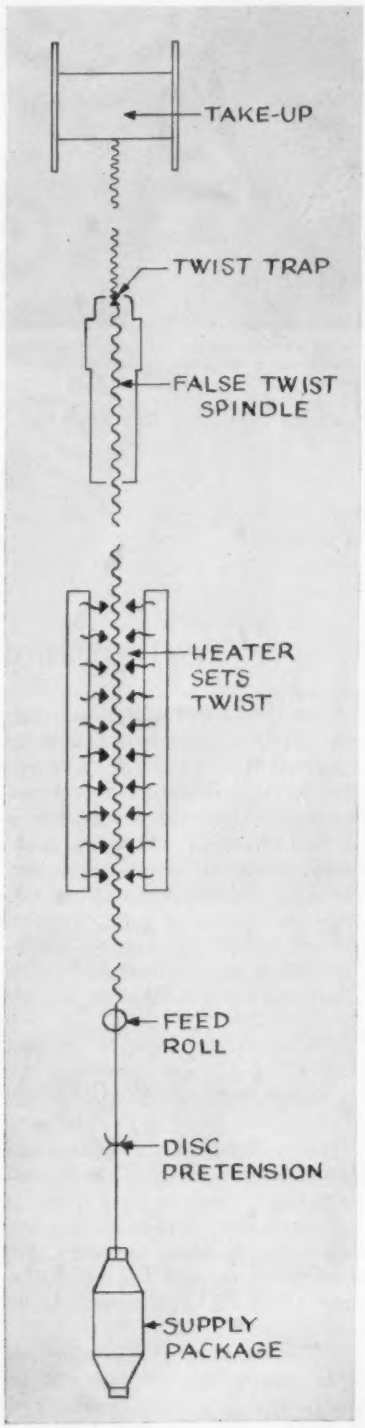
Warp Stretch Fabric Route

1. Relax-scour in beck
2. Dye and finish in beck, in normal manner, as required by fibers present in blend
3. Hydro-extract
4. Heat-setting *not* required
5. Decating to proper degree for full development of torque forces in yarn

Filling Stretch Fabric Route

1. Relax-scour, preferably in beck; tensionless jig may be used
2. Dye in beck or in tensionless jig
3. Dry in loop dryer, or in tenter dryer without tension
4. Heat-set at proper temperature for required amount of time — with fabric width properly adjusted to obtain desired degree of stretch; drying-curing can be combined if suitable equipment is available
5. Finish by application of resins or other finishing agents, as required, in a separate operation

Continuous methods of producing stretch yarns by the false-twist principle, such as shown in this threadline diagram of the Superloft process, offer tremendous economies over the conventional batch-type process. In one continuous operation, the yarn is twisted and heated under controlled temperature and tension, and then untwisted.



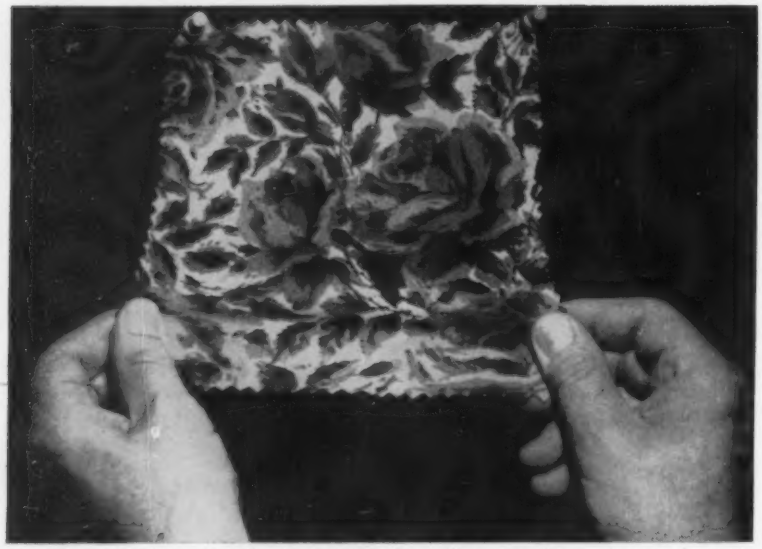
COURTESY LEESONA CORP.

Wanted: A clean nylon

In relaxation-scouring processes which follow each other in the same equipment, it is necessary to remove all of the residual spinning oil remaining on the nylon. This may call for a more exacting scouring formulation to remove the small quantity of oil which has not been oxidized at the high temperatures used in heat-setting the yarn. The oil is now present in a modified form, which is more difficult to remove, creating the real possibility of producing faulty dyeings. Consideration must also be given to properly scouring the other fiber components present in the blend. Cotton yarns obviously require a more thorough preparation than rayon yarns.

For the purpose of this article, the dyeing operations need not be discussed, for they follow the procedures already established for dyeing blends in conventionally woven fabrics. It might be mentioned, however, that the dyeing process becomes more complicated as the number of fibers in the blend increases, thus prolonging the cycle beyond three hours.

By far the more important operation from the standpoint of altering and preserving fabric stretch is finishing. Here the routes will vary, as already pointed out, requiring hydro-extraction and loop drying for processing a warp stretch fabric. In finishing filling stretch fabrics, a tenter-dryer can be used for drying but



Woven stretch fabrics can also be printed; this nylon crepe has a degree of stretch suitable for a dress goods fabric. The fabric was printed by Stafford Printers, Stafford Springs, Conn., whose plant is equipped to dye and finish both warp and filling stretch fabrics by virtue of experience in handling silk fabrics and man-made-fiber-blend fabrics. Fabric was furnished to *Textile Industries* through the courtesy of the Chemstrand Corp.

with strict observance of tension on width. Heat-setting is the key operation. It is the additional tool of the fabric designer to achieve the precise degree of stretch required.

Testing: Important key to quality

From throwing through weaving and finishing, in-process testing is essential to produce uniform stretch characteristics in volume finishing. The testing procedure for the throwster and weaver, already discussed, can be extended for use by the weaver and finisher alike. A sample of fabric can be relaxed before finishing to determine its stretch potential.

Although the maximum stretch potential of the finished fabric can be measured precisely on the Instron tester, in which the fabric sample is elongated to a predetermined load, hand stretching of the sample to its maximum elongation should give reasonably accurate results, according to a technical bulletin of the Du Pont Co. One finishing plant reports another method of testing in which a 10-lb load is applied to the fabric.

Needed: A new set of standards

The problem of how best to measure maximum stretch potential in a given finished fabric is not the most critical problem facing this budding industry. According to reports in the trade, there are more urgent needs to be met:

1. Determining for industry-wide acceptance what should be the maximum stretch potential of a fabric for a given end-use.

2. Establishing standards of performance in end use.

3. Establishing standards of performance in laundering and dry-cleaning with respect to changes in fabric dimensions and stretch characteristics.

4. A more realistic approach in establishing costs of finishing since more precise techniques are required and greater risks may be involved, the fabrics being of high quality and of higher raw material and manufacturing cost.

As yet, the industry has not been acting as a unified whole to meet these critical needs, which can most certainly retard the progress of this development. Nor are the more obvious markets being actively pursued — for instance, the market for women's toreador pants, which calls for a filling stretch fabric. Some estimates of the growth of woven stretch fabrics, therefore, are not altogether optimistic for the *immediate* future. Joseph A. Lopez, a Chemstrand merchandising executive, placed nylon consumption for woven stretch markets as reaching about 23,000,000 lb by 1964. However, he has revised his estimate to about 15,000,000 lb in view of the present slow rate of growth; though he is confident the industry will ultimately reach its full stride.

Steps are being taken by some firms to insure that quality fabrics with sound performance are being marketed. Chemstrand Corp. for one, is supporting merchandising programs for fabrics which have passed the company's exhaustive evaluations in garment form. Other well-known trademarks are also supporting quality fabrics to gain consumer confidence.

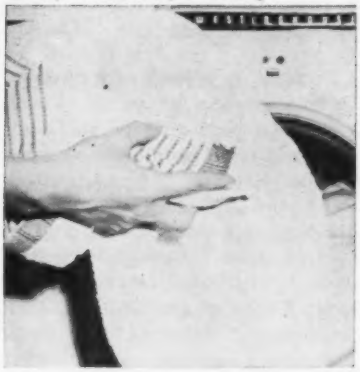
But at this point, the industry is not fully meeting the challenge of a development that has no precedent since it offers infinite fabric styling possibilities and hence profitable merchandising opportunities. This is particularly distressing since much of the technical know-how already has been acquired to launch woven stretch fabrics on a sound basis. Not the smallest failure has been the tendency of some merchandisers and finishers to oversimplify the new technologies that are required to develop and preserve the one key property upon which depend fabric performance and repeated sales.

Notes

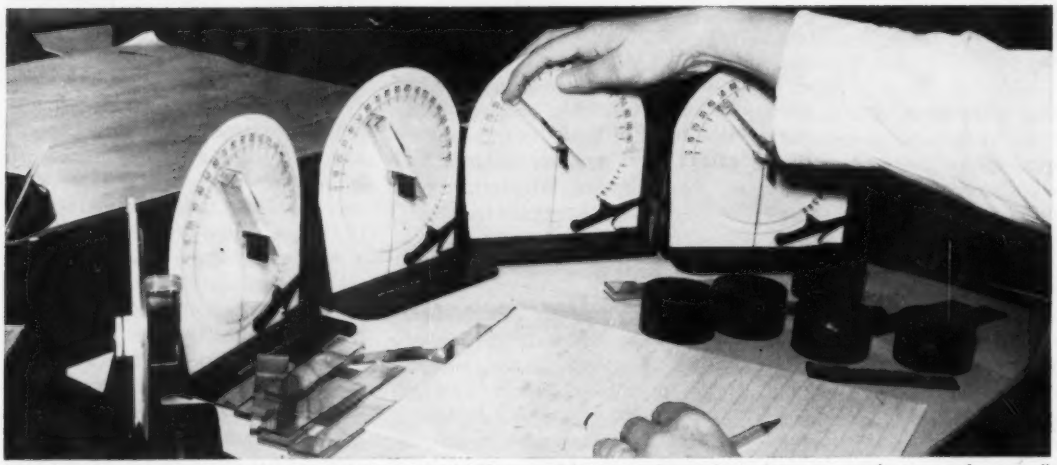
Superloft is a registered trademark of Leesona Corp.

Helanca is a registered trademark of Heberlein Patent Corp. Through an agreement with Heberlein, producers of false twist stretch yarns such as Superloft can obtain the right to label their yarns with the Helanca trademark.

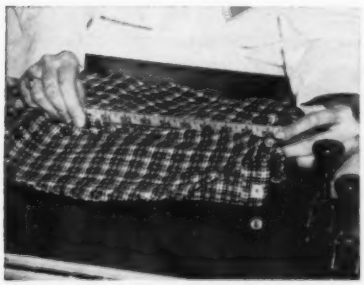
"One of the first problems to be overcome was rayon's instability to washing."



Progress in wash-wear rayons

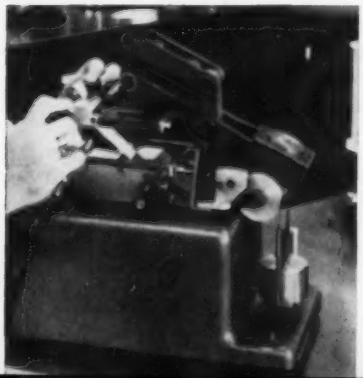


"The time has not yet arrived when sheer, light-weight 100% rayon fabrics can be made to have true wash-wear performance."



"Light-weight fabrics, made with a blend of 65% polyester and 35% high wet modulus fiber have less than 1% shrinkage."

"A continual compromise must be reached between wash-and-wear and abrasion resistance."



by I. H. Welch
Head, Dyeing & Finishing Div.
Technical & Textile Ser. Dept.
American Viscose Corp.

Exclusive

THE PURPOSE of this article is to discuss briefly the past history, the present status, and the future developments of wash-and-wear rayons and to outline the problems that still remain to be solved with rayon fabrics.

Wash-and-wear, if taken literally, means that a wash-and-wear garment can be worn without ironing. I doubt that many woven garments, regardless of fiber content, can actually pass such a critical test for a fastidious person. If, on the other hand, we accept the more general and practical interpretation of wash-and-wear, which is really "ease of care," then there are available today woven rayon garments which qualify.

"Ease of care" can be easily understood to mean — Wash any way you care to, dry any way you care to, and the garment will show the following characteristics:

1. Much greater ease of ironing and much less need for ironing.

2. Dries at a much faster rate than ordinary finished fabric if it is necessary to drip dry, as when

High wet modulus rayon fibers seem to offer the greatest hope for the future, either with resins or with the new chemical cross linking finishes

traveling.

3. Freedom from excessive mussing on wearing.

4. Color satisfactorily retained through repeated washings and wearings.

5. Dimensional stability during the life of the garment.

6. Adequate physical properties to insure satisfactory wear life.

Specific rayon fabrics, properly designed and finished, offer the above properties. However, sheer light-weight fabrics with good wash-and-wear properties and adequate physical properties for normal wear are not available either in rayon or cotton.

Chemical Finishing. With the introduction years ago of regular spun rayon, one of the first major problems to be overcome was rayon's instability to washing. The early approach to solving this problem was through the use of monomethylol and dimethylol urea formaldehyde type resin and later melamine formaldehyde type resins. These resin finishes imparted some degree of shrinkage control as well as a decided improvement in crease resistance. However, upon repeated launderings the chemical bonds were broken and as the resin was gradually removed, the fabric lost its crease resistance and its stability.

In the late 1940's and early 1950's several durable chemical stabilizing finishes for rayon were introduced. Three of the more popular stabilizing finishes of that era were "Sanforset," developed by Cluett, Peabody & Co., Inc.; "X-2," developed by Dan River Mills; and "Avcoset," developed by American Viscose Corp. All of these finishes, and others, imparted to rayon fabrics dimensional stability, increased wear life, durability to repeated washings, a resistance to mussing, and freedom from chlorine damage. However, none of these finishes enabled rayon fabrics to be classified as wash-and-wear, and actually this was not their intent.

The American Viscose Corp. put forth considerable effort to modify the Avcoset process by incorporating various thermosetting resins (DMEU and triazone) in combination with the cellulose ether and formaldehyde. This combination of chemical finishes, plus a hot calendering prior to curing the resin, yielded an improvement in wash-and-wear properties. It was however, most effective on heavier-weight fabrics, such as the heavy-weight linen-weave rayon fabrics and the heavy sheen gabardines. Such heavy-type rayon fabrics were losing their popularity at this time, since the trend in apparel was toward light weight.

The introduction of dimethylol ethyleneurea (DMEU) resins offered the rayon finishers a useful resin for imparting ease of care properties to rayon. DMEU not only imparts crease resistance but also imparts dimensional stability with durability to repeated launderings. The monomeric urea formaldehyde resins are deficient in these last two properties. DMEU, like the monomeric urea formaldehyde resin, retains chlorine, although damage is not as severe, and it is recommended that fabrics treated with these resins should not be bleached with chlorine. DMEU is not as widely used on rayon fabrics as is the monomeric or dimethylol type resin due to increased cost of the resin. It is felt however, that the improvements offered by DMEU are worthy of this slight increase in cost.

The acetal cross linking chemicals, as well as the epoxy resins, gave the rayon finishers new chemicals for stabilizing rayon with some improvement in ease of care properties. They do not however, offer sufficient wet and dry crease resistance to help rayon attain wash-and-wear properties. Rayon fabrics treated with either of these chemical finishes may be bleached with chlorine bleach in normal concentration without suffering damage due to retained chlorine.

Both triazone and triazine type resins, which have been widely accepted in the finishing of wash-and-wear cotton fabrics, have been used less extensively on rayon. Both of these resins impart to rayon stability and improvement in crease recovery, durability to laundering, and a freedom from excessive chlorine damage, with an improvement in ease of care properties. Like DMEU, their use on rayon has been somewhat limited because of cost.

Factors in Wash - And - Wear. There are many factors other than chemical finishes which influence wash-and-wear properties of rayon fabrics. So far I have written about the influence of chemical finishes on rayon fabrics, and in judging these finishes I have considered their application to relatively light-weight shirting and dress-weight fabrics made from 1.0- and 1.5-denier rayon, either plain dyed or white. Fabrics in this classification are the most difficult to make wash-and-wear.

As style trends permit, fabric construction, coarse deniers, coarse yarns, texture, color, and pattern all have a strong influence on wash-and-wear appearance. An example of an easy rayon fabric to obtain a high level of wash-and-wear performance on would be a relatively square weave fabric woven from coarse yarns of 3.0-denier rayon and printed in an over-all pattern. Such a fabric finished with a DMEU resin would have adequate physical properties for long wear life and would have excellent wash-and-wear performance.

The reasons for this high level of performance are obvious. The designer has taken advantage of physical characteristies such as denier, yarn, twist, and construction, as well as psychological characteristics such as print, pattern, and color. The application of an adequate amount of a durable cross linking agent such as DMEU provides additional recovery and stability.

Tradition as well as style trends, however, demand many more fabric constructions and designs than the example just described. It is for this reason that the rayon fiber manufacturers, the resin manufacturers, and the finishers still have a task before them, for the time has not yet arrived when sheer light-weight 100% rayon fabrics can be made to have true wash-and-wear performance.

Newer Type Rayons. Within the last few years rayon manufacturers have introduced to the trade rayon fibers having special properties. Avron and Narcon are high-

strength rayon fibers; Corval is a cross linked rayon fiber featuring greater bulk and crease resistance; and Avril, Moynel, and Zantrel are high wet modulus fibers offering high strength and dimensional stability. While these fibers have special and unique properties, they still must be chemically finished to have ease of care properties.

The high-strength rayon fibers have found ready acceptance as blend fibers with triacetate and certain type polyesters, where the high-strength rayon permits the spinning of much finer count yarns than is possible with either 100% of the synthetic or in a blend with other cellulosics. The high-strength rayon makes possible the use of such synthetics in light-weight wash-and-wear fabrics.

The high wet modulus rayon fibers, which offer dimensional stability, high wet and dry strength, good resistance to alkali, as well as better abrasion resistance, seen to offer the greatest hope for the future in accepting either higher resin levels or the newly emerging wash-and-wear finishes.

New Finishes. During the past year, two new finishes, Prestwick and Bancare, both reportedly based on the use of formaldehyde, have been introduced. Both finishes impart to rayon fabrics dimensional stability within 1%. These finishes are durable to repeated launderings and are non-chlorine retentive so that normal amounts of chlorine bleach may be used without fear of degradation or discoloration.

As with most chemical finishes, a compromise must be reached between wash-and-wear properties and physical properties. If the fabric construction and end use requirements will allow, excellent wash-and-wear properties can be obtained with formaldehyde-based finishes, but at some cost in tensile and tear strength, and abrasion resistance.

Such finishes should prove to be excellent for rayon draperies, offering dimensional stability, crease resistance, freedom from the elevator effect which has been a problem in unresinated rayon draperies, and wash-and-hang properties. A higher concentration of finish can be used on drapery fabrics than on apparel fabrics since abrasion in draperies is not a problem.

Light-weight fabrics made from regular rayon and finished with Belfast have produced excellent wash-and-wear properties; however, the fabrics showed a loss in physical properties such as tensile, tear, and abrasion which reduced the wear life. Recent experiments with Belfast applied to the high wet modulus fibers have shown equally good wash-and-wear performance with a much greater retention of physical properties.

The high wet modulus fibers have higher original strength and abrasion than regular rayon, and because of their greater resistance to alkali they lose less strength during the chemical treatment. Belfast, on high wet modulus rayon fabrics, offers another opportunity to produce rayon fabrics having wash-and-wear properties equal to the best that can be presently obtained on cotton, but with higher physical properties than cotton.

Recently reported in the press are new finishes such as Ganalok A-14 and Retane, both reported to be materials in the general sulfone chemistry field. These finishes as well as others are presently being evaluated by American Viscise Corp. on the different types of rayon fibers available today.

Rayon-Cotton Blends. Rayon accepts resin in the lower concentrations of 10 per cent or less with little or no loss in tensile and tear strength. On the other hand, cotton when treated with much less resin suffers an appreciable loss in tensile and tear strength. A considerable amount of development work has been done by the rayon fiber producers and several large textile mills, in the blending of rayon with cotton.

An accepted blend level has been 70 per cent cotton and 30 per cent regular rayon. This blend level was selected since it yields approximately equal dry and wet strength. Such a blend also permits mercerization while blends with higher percentages of rayon present difficulties in mercerization. While such a blend shows approximately an 11 per cent loss in tensile strength in the grey, by the time the fabric has been prepared, dyed or printed, and resin finished to have wash-and-wear properties it is from 10 to 15 per cent stronger than a comparable all-cotton fabric.

Regular rayon in such blends not only produces wash-and-wear fabrics with greater strength than a comparable all cotton fabric, but also yields a cleaner, more lustrous fabric. When such fabrics have been finished with a nitrogenous resin, the cotton-rayon blend suffers less damage from retained chlorine than an all-cotton fabric. The cotton-rayon blend fabric requires slightly more resin than all-cotton to achieve the same degree of crease recovery and wash-and-wear performance.

In certain cotton fabrics where finishing for wash-and-wear performance reduces the tensile strength to an unsatisfactory level, the blending of 33 per cent regular rayon can provide sufficient added tensile strength to safely meet the minimum requirements.

Early development work now under way with cotton and the high wet modulus rayon fibers is in the area of 50/50 blends. Such blends should have many advantages over all-cotton and over the 70 per cent cotton 30 per cent regular rayon blends. The high wet modulus rayon fiber has a stress-strain curve more like that of cotton and so a higher percentage may be used; and since it is a stronger fiber both wet and dry than regular rayon, higher tensile strengths are obtained. The inherent stability of the high wet modulus fiber plus its greater resistance to alkali makes this fiber much more suited to normal continuous bleaching, mercerizing, and general cotton processing than any other type of rayon fiber.

Such blends, finished with one of the accepted cotton wash-and-wear finishes, should produce a fabric having a high level of wash-and-wear performance with appreciably better tensile strength, tear strength, and abrasion resistance than is now available in the market. It should also permit the fabric designer greater latitude in

designing light weight fabrics for wash-and-wear.

Rayon-Synthetic Blends. Blends of polyesters and rayons are of considerable interest in the trade today. The recent advances in rayon fiber technology, with the introduction of the high strength rayon fibers (Avron and Narcon) and the high wet modulus fibers (Avril, Moynel, and Zantrel) plus the advances in finishing techniques, have contributed to overcoming the negatives normally associated with polyester-rayon blends in light-weight apparel fabrics.

Light-weight fabrics, made with a blend of 65 per cent polyester and 35 per cent high wet modulus fiber have shown better automatic wash-and-wear, seam appearance, and ease of ironing than a comparable fabric made with 65 per cent polyester and 35 per cent cotton. In addition, the fabric has less than 1% shrinkage which has been difficult to obtain with 65 per cent polyester and 35 per cent regular rayon. In these blends rayon has shown a significant improvement over cotton in automatic wash-and-wear. This has been demonstrated and has been reported on several times.

Recent papers which made reference to this include "New Developments in Evaluating Wash-and-Wear Performance," by James R. Bercaw[1], and "Polyesters and Modified Rayons In Light Weight Fabrics," by J. H. Anderer[2].

While the mechanism for this behavior is not fully understood, it would seem to be related to fiber friction and to the fine structure of the fiber itself as it affects resilience under the short loading cycles encountered in tumble drying. This resilience prevents the formation of fine muss-type wrinkles in the tumble dryer which are characteristic of polyester-cotton.

Polyester-rayon blends offer a soft, supple, silky hand that can not be obtained with polyester-cotton blends. In addition, when it is desirable, crispness and greater cover can be achieved through the use of hot wet calendering.

The technique of hot wet calendering was developed in the Du Pont Laboratories and was reported by J. E. Reith and J. R. Bercaw, "Fabric Aesthetics In Staple Blends," at the National Research Council Advisory Board meeting in May, 1960.

The treatment is inexpensive and involves the feeding of a damp fabric (5 to 30% moisture) through a Schriener calender at from 300 to 380 F, with from 10 to 35 tons pressure. This treatment should be followed by heat setting and some type of wet working to remove the slight harshness and excess luster imparted by the high pressures. By changing the three variables of moisture, temperature, and pressure, quite a wide range in hand, luster, and cover can be achieved. It has been found that such a treatment also makes an excellent base for printing, giving sharper, clearer colors and print pattern definition.

Hot wet calendering of the rayon blends reduces the wash-and-wear ratings slightly over the uncalendered blends. However, the automatic wash-and-wear rating is still superior to the cotton blends.

Suiting-weight fabrics of polyester-rayon blends have been in the market for several years, and have given satisfactory wash-and-wear performance when properly constructed and finished.

Other rayon blends which have been found to give acceptable wash-and-wear performance when properly designed and finished are the acrylic-rayon blends and the triacetate-high-strength rayon blends.

Rayon's Research Goals. One of the most important problems to be overcome in improving wash-and-wear on rayon is its high degree of swelling. As the fiber swells and creases are formed in the washing machine, these wrinkles or creases are not removed during drip drying or spin drying. If fiber swelling can be reduced to less than 20 per cent, then rayon can be expected to have excellent drip and spin-dry properties.

The tumble drying performance of treated rayon fabrics is very good and for the most part is as good as treated competitive fibers. Ratings of from 4 to 4+ by the proposed AATCC test procedure can be readily achieved even in the lighter weight and more difficult fabric constructions.

The resilience of rayon under low conditions of humidity is excellent but as the fiber absorbs more moisture (11% at 65% RH) the resiliency is greatly reduced. While the resiliency is improved by chemical cross linking and resination, still further improvement must be achieved if we are to improve on the present wash-and-wear properties.

Another important problem of rayon as well as other cellulosics is abrasion resistance. The cross linking agents and resins reduce the abrasion resistance of the cellulosic fibers so that a continual compromise must be reached between wash-and-wear performance and abrasion resistance. As the abrasion resistance of the fiber is improved or the severity of the reduction caused by the chemical treatment reduced then we can expect to see further improvements in wash-and-wear performance.

The high wet modulus rayon fibers have made important strides in offering an improved rayon fiber for wash-and-wear. The cross sectional swelling of such fibers is approximately 55 per cent compared to regular rayon, which swells approximately 80 per cent. With this initial reduction in swelling, plus its inherent dimensional stability, reduced sensitivity to caustic, and increased fiber stiffness, abrasion resistance, and tensile strength, it is felt that this fiber type offers the most promise for achieving better wash-and-wear with the new finishes now on the horizon.

Trademarks

Avril—American Viscose Corp.
Avron—American Viscose Corp.
Bancare—Jos. Bancroft & Sons Co.
Belfast—Deering Milliken Research Corp.
Corval—Courtaulds (Alabama) Inc.
Ganalok A-14—General Aniline & Film Corp.
Moynel—Courtaulds (Alabama) Inc.
Narcon—North American Rayon Corp.
Prestwick — Courtaulds (Alabama) Inc.
Retane—Monsanto Chemical Co.
Zantrel—Hartford Fibres Co.

[1] *Am. Dyestuff Reptr.*, Feb. 22, 1960.
[2] *Modern Textiles*, Dec., 1960.

Man-made elastic yarns

The spandex fibers—what they are and their availability

Lycra spandex fiber—its properties and applications, and processing tips

GENERAL RADIO CO.

For covered yarn constructions in which the core yarn is the limiting factor of covering machine speed, yarns of Lycra spandex fiber are advantageous as they permit use of higher operating speeds.

by T. B. Marshall
Textile Fibers Department
E. I. du Pont de Nemours & Co.

Exclusive

SPANDEX is the generic term (like nylon or rayon) used to identify an entirely new class of elastomeric fibers. In the formal terminology of the Federal Trade Commission, it describes "a manufactured fiber in which the fiber forming substance is a long-chain synthetic polymer comprised of at least 85 per cent of a segmented polyurethane."

Fibers are classified as elastomers when, because of their chemical composition, they have a high break elongation (in excess of 200 per cent) and both a high degree and a rapid rate of recovery from a given elongation. This definition purposely excludes fiber assemblies such as "Helanca" and similar stretch yarns which owe their stretch properties to physical changes in the spatial configuration of individual filaments. It also excludes undrawn conventional "hard fibers," like nylon, which exhibit high elongations but possess little or no recovery after being stretched.

A useful, if over-simplified, line of thought can be used to distinguish between end-use applications for the different types of stretch yarns. Those from elastomeric fibers will be used where the high retractive forces provided by the chemical structure gives a measure of holding power or control, for example in girdles, surgical hosiery, and waistbands. Stretch yarns of the "Helanca" type will generally be used where conformity is desired, for example in leotards and socks. The dividing line is not sharp, and it can be expected that the elastomers and the stretch yarns may find use in similar garment applications.

The Spandex fibers show elastomeric behavior because of the way the chemical building blocks have been lined up in the individual polymer chains. "Soft" elongatable segments alternate with "hard" segments. The soft sections provide the necessary give, while the hard segments tie the chains together at various points. These tie-points inhibit excessive flow of the polymer (stress decay) when the fiber is held under tension and cause it to snap back when the fiber is released.

The spandex fibers, as a class, are chemically much different from rubber. They also can be quite different from each other. The polyurethane group is the chemical chain linkage they all possess that distinguishes them from rubber. Beyond this "common bond," however, there can be wide dissimilarities in the chemical make-up of the different spandex fibers and, hence, in their physical and functional properties. Spandex users will have to satisfy themselves that the "brand of their choice" is giving them all the properties they need in their product.

Availability of Spandex. Certainly the most talked-of characteristic of the spandex fibers today is their scarcity. At least seven companies are now manufacturing or have sampled the trade with their versions of spandex yarns. Over the past year and a half, two spandex yarns have been available in quantities that approach being commercial. These are "Lycra," produced by Du Pont, and "Vyrene," produced by U. S. Rubber Co.

In addition to these, the International Latex Corp.'s spandex is on the market and launched in elastic fabrics. Despite this activity, the present supply is entirely

inadequate to meet demands.

Unlike many new products which must fight their way into established markets, the advantages of spandex fibers were recognized almost at once, and they have been in critically short supply since they first appeared on the market. This situation will certainly continue until well into 1962 when full-scale commercial facilities can be brought into operation. This was the story with nylon for hosiery in the early Nineteen Forties, and it probably is inevitable when a radically improved material of construction is introduced into any industry.

Pilot-plant quantities of Lycra for trade use have been in production since last year. Construction of a commercial-scale plant started in February of this year at Du Pont's Waynesboro, Va., location. That work is on schedule and is expected to be completed during the second quarter of 1962. At that time, supplies of Lycra should be increased anywhere from six-fold to 10-fold compared to present supplies.

In the foundation industry, which is the largest market for elastic fibers, spandex yarns still cannot account for more than 10 per cent of sales. But store buyers, aware of the sure-fire sales potential of spandex, are becoming reluctant to accept garments made with conventional yarns and have been demanding spandex to fill out their new lines. Considerable confusion has resulted in the industry. This has led, in June, to an unprecedented warning by industry associations that buyers who planned to base their 1961 fall lines solely on spandex would be committing "departmental suicide." This widely publicized statement pointed out that while spandex continued to be in such short supply, conventional fabrics clearly would be needed to fill out requirements in sufficient depth and diversity.

While the acute shortage prevails, production of Lycra is being channeled to the traditional elastic fabric manufacturers, and development work in other areas will have to wait until the situation is alleviated.

TABLE 1. Physical Properties of Lycra Spandex Fiber*

Deniers available	70, 140, 280, 420, 560
Break tenacity, gpd	0.6-0.8
Break elongation, %	520-610
Power at 50% elongation, gpd	0.03-0.04
Power at 200% elongation, gpd	0.10-0.12
Stress decay, 1 min at 50% elongation, %	6-8
Tensile recovery from 50% elongation, %	93.5-96
Moisture regain at 70 F, 65% RH, %	1.3
Specific gravity	About 1.0
Abrasion resistance	Good
Flex life	Good
Color	White
Luster	Dull
Fume oven exposure, 16 hr	
Color change	Moderate-Yellow
Physical property change	None
Fade-Ometer exposure, 16 hr	
Color change	None
Physical property change	None to slight
Resistance to heat	Yellows and degrades over 300 F
Melting point, °F	482
Sticking temperature, °F	347

*As shipped, less finish

How Spandex Is Offered. Spandex fibers are being offered in a variety of physical forms, and these generally are in keeping with their manufacturers' established ways of doing business. Some are closely similar to the square-cut and extruded rubber threads now in use. Lycra is sold as a textile yarn in a range of deniers. Vyrene is sold in nylon-covered form as a new "Lastex" yarn.

Vyrene is a monofilament. Available core sizes range from 75 to 150 gauge, with double-covered 75 and 90 gauge probably the most widely used in foundation garments. The lighter yarns are offered in a textured Lastex yarn construction. Here the core of Vyrene is provided with a loose spiral wrapping of nylon. This yarn, handled in the stretched position, is said by the manufacturer to perform satisfactorily in looms and to provide a desirable soft hand to knitted fabrics.

Yarns of Lycra are presently supplied in 70, 140, 280, 420, and 560 denier, with 420 denier accounting for most of the sales. The 560-denier yarn is equivalent in size to a 90-gauge extruded rubber thread, while the extremely fine 70-denier yarn would be equivalent to a 250-gauge rubber thread if such were available. Rubber seldom is made in gauges finer than 125.

Lycra spandex yarn is a multifilament bundle in which the individual filaments have been joined together. It is sold without a covering and is either processed directly into fabrics in the "bare" state or first covered with "hard" fibers in the manner of conventional elastic yarns.

Development of Lycra. For more than 13 years, Du Pont chemists have been working actively on the development of elastomeric fibers that would represent an improvement over the natural and synthetic rubber yarns in common use. The first approaches were in the direction of modifying nylon and polyester polymers, but the fibers obtained, while highly promising, always turned out to be deficient in some respect, such as in hydrolytic instability or excessive stress decay. Garments that couldn't stand hot

TABLE 2. Chemical Exposure Tests—Lycra[1]

Chemical	Conc	Temp °F	Time	Effect on Physical Properties	Effect on Color[2]
Soaps, detergents[3]	—	—	—	None	1
Perspiration (acid and alkaline)	Std AATCC	120	24 hr	None	1
"Perclene"[4]	100%	Room	45 min	None	1
"Perclene"[4]	100%	80	35 dry-cleaning cycles	Mod	3
Stoddard solvent	100%	Room	45 min	None	1
Carbon tetrachloride	100%	Room	45 min	None	1
Hydrochloric acid	10%	120	24 hr	None	3
Sulfuric acid	10%	120	24 hr	Slight	3
Hydrogen peroxide	3%	120	24 hr	Slight	3
Sodium hydroxide	10%	120	24 hr	Slight	3
Benzoic acid	2%	212	1 hr	Slight	1
Orthophenylphenol	2%	212	1 hr	Slight	1
Sodium hypochlorite	1%	120	24 hr	Degraded	5
Calcium hypochlorite[5]	1 ppm	Room	1 wk	None	1
Calcium hypochlorite	3 ppm	Room	1 wk	None	4
Calcium hypochlorite	9 ppm	Room	1 wk	Slight	5
Sea water	100	Room	1 wk	None	1
"Snowy" bleach[6]	per pkg	140	20 cycles	None	0
Olive oil	100	100	2 wk	None	3
Mineral oil	100	100	2 wk	None	1
Lanolin	100	100	2 wk	None	3
Sun-tan lotions[7]	100	100	2 wk	None-Slight	2
Rubber processing oils	100	100	2 wk	None	1-3

[1]Tests made on finish-free yarn.
[2]O, trace—whiter; 1, none; 2, very slightly yellow; 3, slightly yellow; 4, moderately yellow; 5, yellow.
[3]Various tests at garment use conditions.
[4]Du Pont's perchloroethylene.
[5]Swimming-pool concentration, available chlorine 0.5 ppm maximum.
[6]Sodium perborate, product of Gold Seal Co.
[7]Lotions tested were Sea & Ski, Rolley Co.; Coppertone, The Coppertone Co.; Sunbath, Revlon, Inc.

water or ones that grew appreciably larger during the course of a day's wearing would have had little attraction for the American woman.

By 1950, entirely new types of chemical reactions were worked out which supplied the answers to the major problems, and the ultimate result was Lycra. Lycra (originally called Fiber K) was first introduced to the textile trade for evaluation in April of 1958. It was then being made on laboratory equipment.

By the beginning of 1961, Du Pont had already spent well over $10,000,000 on the development of Lycra to take it from the test tube to commercial manufacture, and this figure is exclusive of pilot and full-scale plant construction costs. The process involved is the most complex ever undertaken by Du Pont in the production of a textile fiber, and the manufacture of high-quality yarn on a commercial scale is a task of considerable magnitude. Extensive research and development is continuing on further improvements for the fiber.

Properties of Lycra. The properties of Lycra offer distinct advantages to manufacturers, retailers, and consumers of foundation garments, swimwear, surgical hose, and other elastic products.

First is the obvious advantage of greater comfort. Garments of Lycra are softer, lighter in weight, and sheerer, yet they still exhibit excellent holding power and figure control. This is possible because Lycra can be made in finer deniers and with more power than conventional elastomer yarns.

Next is the advantage of sales appeal and style. Lycra opens up new opportunities for the fabric and garment designers. This strong, lightweight fiber can be used covered or "bare" in a wide variety of fabric weights and constructions not possible with the heavier, covered rubber yarns. It possesses a white color in its natural state and is dyeable. The multifilament character of the yarn facilitates sewing and prevents needle cutting, which is a headache with conventional monofilament yarns. The needle can penetrate the yarn bundle with very little damage to the yarn, thus more sewing can be used in garment decoration and design.

Finally, the properties of this spandex fiber provide good functional performance and long service to the consumer. Properly engineered garments of Lycra are machine washable and dryable. Temperature settings recommended for synthetic and wash-and-wear loads are suitable. One caution—bleaches containing chlorine should be avoided since they can yellow and degrade the fiber.

In a laboratory test, representa-

tive brassiere and girdle fabrics of Lycra and conventional elastic fabrics were subjected to 50 machine-wash cycles at 140 F and tumble-dried at 180 F, followed by 10,000 flex cycles. All fabrics of Lycra remained serviceable. Two of the four control fabrics failed before 5,000 flex cycles.

The following yarn properties indicate what can be expected in the way of garment performance: high strength, uniformity, high abrasion resistance, high modulus and flex life, resistance to ultraviolet light, to weathering, to chemicals, to cosmetic oils and lotions.

Prolonged exposure to ultraviolet radiation or to atmospheres containing gaseous combustion products (i.e., from powerhouses, automobile exhausts, furnaces, industrial plants) can yellow yarns and fabrics of Lycra. However, the degree of discoloration is slight except under severe conditions.

Tables 1 and *2* are reproduced from Du Pont's New Product Technical Information Bulletin NP-16. They show the important chemical and physical properties of Lycra.

A comparison of the tensile properties of Lycra spandex fiber *(Table 1)* with those of rubber should help explain the mechanical basis for the advantages mentioned above. The amount of stretch-before-breaking of Lycra is comparable to that of a cut rubber yarn (520 to 610 per cent vs 760 per cent for rubber), but the breaking strength is three times as great for a fiber of equal weight (0.6 to 0.8 gram per denier vs 0.25 gram per denier for rubber).

The tenacity, or holding power, at intermediate stretches, is proportionately greater for Lycra. Thus, a much lighter fiber or fabric of Lycra will do the same job of holding; or, looking at it the other way, the same weight fiber or fabric will do a much better job than cut rubber.

Besides providing lighter, more desirable fabrics, these properties tend to equalize fabric costs despite the higher initial price of the Lycra. In practice, it is found that one pound of Lycra provides the same holding power as 1.8 pounds of rubber.

At a given per cent stretch, the stress decay of Lycra is higher and the tensile form recovery is less complete than for rubber, but it must be remembered that the power exerted at this stretch is considerably higher.

Fabrics of Lycra. Although the expression "100 per cent Lycra" is often used, this, of course, refers only to the elastic yarn components of the garment. There is no fabric or garment of 100 per cent Lycra on the market. Lycra can replace all of the elastic in any type of fabric or garment made, including the narrow-fabric findings, support straps, stay-up-bands, and decorative fabrics that go into foundation garments. However, it is always knit or woven with another fiber such as nylon, Dacron, Orlon, or some other rigid fiber to provide a complete balance of properties. The percentage of Lycra spandex fiber depends on the holding power desired and the job the garment is intended to do.

It is important that garments using Lycra in the elastic components of the body fabric use it also in the findings and other elastic accessories so that weak points do not exist that will penalize the garment's serviceability and performance. Also, Lycra, like other textile fibers (nylon, rayon, etc.) is not immune to discoloration from certain rubber compounding agents which might be extracted from rubber findings during laundering.

Despite shortages, the foundation trade generally has made wise use of the available Lycra by employing adequate amounts to do the required jobs properly. However, each manufacturer using Lycra should continue to make sure that his fabrics contain enough of the fiber and that the findings he puts on his garments are also of Lycra. Not only is less Lycra required in a fabric to meet established standards for holding power and elongation, but lighter "hard fiber" yarns also can be used in yarn covers.

Table 3 shows comparative constructions and weights of typical foundation fabrics made using Lycra and using rubber, and it can be seen that fabrics of Lycra are considerably lighter.

The three fabrics described in *Table 3* are basic to the foundation garment industry. They are power net, filling stretch leno, and warp stretch leno. In addition to these, Lycra spandex fiber for foundation garments is now being used commercially in satins, Jacquard bobbinet, woven narrow fabrics, and a variety of circular-knit constructions.

Yarn Covering. An attractive feature of Lycra is that it can be used either covered or "bare," and this provides valuable degrees of freedom for fabric engineering. Since the covering process is basic to the use of elastic fibers, it deserves a brief description.

Two layers of a "hard fiber" covering yarn (nylon, rayon, etc.) are generally used, and these are wound onto the elastomer yarn in opposite directions while the latter is moving through the covering machine under an applied tension. The two wrappings give a balanced structure with a minimum of twist liveliness.

In a typical covering machine, the elastomer enters at the bottom, passes through two hollow spindles and is wound up on the final package at the top. Wrapping is accomplished by rotating at high speed the spindles carrying the covering yarns.

In addition to protecting the elastic core yarn, there are engineering reasons for covering. First of all, the cover limits the amount of elongation of the total yarn structure since the covers will jam at a predetermined point as the yarn is stretched. The cover yarns bear the stress beyond this point, and there is no danger of breaking the elastomer.

Secondly, as the core yarn contracts, the covers also jam at a predetermined minimum tension. This fixes the length of the yarn at rest, and permits construction of open fabrics that would contract too far if bare elastomers were used. The two jamming points can be used to control the maximum and minimum tension limits between which the yarn will operate and thus the power and elongation of the final fabric.

TABLE 3. Comparison of Properties, Typical Finished Fabrics

Fabric	Size	Cover Yarn	Fab Wt Oz/Sq Yd	Warp Elongation %	Filling Elongation %	Power at 30% Stretch, Lb	Power at 50% Stretch, Lb
Warp Stretch Leno							
With conventional yarns	85-ga cut (800 den)	75-den rayon	9.5	125	—	2.7	—
With yarns of Lycra	420 den	40-den nylon	6.2	100	—	2.7	—
Filling Stretch Leno							
With conventional yarns	90-ga extruded (560 den)	75-den rayon	6.8	—	90	1.6	—
With yarns of Lycra	280 den	40-den nylon	5.2	—	95	1.4	—
Power Net							
With conventional yarns	65-ga extruded (1080 den)	150-den rayon	13.2	100	—	2.2	2.5
With yarns of Lycra	420 den	100-den rayon	6.5	140	—	1.8	2.4

NOTE: Elongation and power determinations made on the Scott Model IP-4 tester—10" loop, 3" wide for warp and filling stretch lenos; 6" loop, 3" wide for power net.

Use of Covered Lycra. The strength, uniformity, and abrasion resistance of yarns of Lycra result in excellent runnability on the covering machine and permit use of the finest denier cover yarns without loss of machinery efficiency or covered yarn quality. High speeds are possible for yarn constructions in which the core is the limiting factor. A wide stretch range of well-balanced, smooth-appearing covered yarns can be made with various fiber covers using elongations of Lycra between 250 per cent and 400 per cent for 280, 420, and 560 denier, and between 250 per cent and 350 per cent for 70 and 140 denier.

Warping, quilling, weaving, and knitting covered yarns of Lycra can be accomplished by using established procedures for covered elastic yarn, so these will not be discussed here.

Use of Bare Lycra. The white color, good strength, abrasion resistance, dyeability, and pleasing hand of Lycra are the properties which permit the use of uncovered or "bare" Lycra in a number of fabrics where it has not been practical in the past to use an uncovered elastomer. This, of course, results in even lighter fabrics than those shown in *Table 3*, and since it avoids the slow, costly yarn-covering step, it also provides an economic incentive.

Uncovered yarns of Lycra spandex fiber are being used successfully in circular-knit and Raschel-knit (power net) foundation fabrics. Other applications in knitted and woven fabrics are under development.

Circular Knitting—The present circular knitting technology for uncovered rubber thread can be applied generally to uncovered yarn of Lycra. Rewinding to a cone may be necessary for the precise tension uniformity required in sheer, lightweight fabrics; and a positive feed device and rotating guide surfaces are required to feed the Lycra to the knitting elements with a constant and uniform tension.

Power Net—Satisfactory processing methods have been developed for use of uncovered yarn of Lycra in warps for power nets. These involve positive surface drives for unrolling the yarn packages. In both warping and knitting, any guide surfaces that cannot be eliminated should be made to rotate. The beam let-off in knitting should be positively controlled.

Tops for Half-Hose—The use of uncovered 140- and 280-denier yarns of Lycra in sock tops has shown savings estimated at two cents to four cents per dozen pairs vs conventional covered elastic yarns. Laboratory tests of sock tops also indicate a distinct advantage for yarn of Lycra in flex life (up to 10 times) over conventional covered elastic yarns.

Scott and Williams, Inc., acting on the suggestions of Du Pont, has developed a new and improved method for using uncovered Lycra spandex fiber laid in circular-knit fabrics. This method was specifically designed to use uncovered Lycra in the tops of half-hose using the Scott and Williams Komet machine. The principle, however, is applicable to other end uses and machines in both rib- and plain-knit constructions.

The KLIK principle, as it is called for Knit/Lay-In/Knit, consists of knitting the Lycra or other elastic yarn over a number of courses on each end of the elastic portion of the fabric or hose and

TABLE 4. Dyes for Lycra Spandex Fiber

Dye Class	Affinity	Build-Up	Washfastness	Lightfastness
Vats	Limited	Medium	Excellent	Fair-Poor
Premetalized	Good	Good	Fair-Poor	Fair
Acid	Excellent	Excellent	Fair-Poor	Fair-Poor
Disperse	Excellent	Excellent	Fair-Poor	Fair-Poor
Cationic	Varies with color	Varies with color	Fair-Poor	Fair-Poor

laying in the elastic yarn in the desired number of courses between these portions.

An attachment for using this principle on a Komet machine is available from Scott and Williams.

Dyeing and Finishing. Fabrics containing yarn of Lycra have been dyed and finished successfully using procedures similar to those for fabrics containing rubber.

Fabrics of Lycra should be processed on machines with devices that provide minimum tension to the fabric, drying temperatures should be kept below 230 F to prevent changes in fabric properties, and bleaches containing chlorine must be avoided.

Scouring—Yarn of Lycra, as supplied, contains an oil finish that is necessary for proper packaging and initial mill processing. It is important that this finish be removed by a solvent-emulsion scour to obtain a clean fabric for subsequent dyeing and finishing operations. The most suitable equipment is a jig capable of processing fabric up to 72 inches in width. It should be equipped with an automatic roll reversing device that provides minimum tension to the fabric.

Bleaching—Bleaching is desirable occasionally for elastic fabrics containing yarn of Lycra spandex fiber and other fibers, although the natural base color of Lycra is satisfactory for most end-uses. Hence, bleaching is primarily a question of whitening the "hard" fibers without yellowing the Lycra. The cast of Lycra, however, can be altered as desired by the use of tints.

The base white of elastic fabrics can be improved with a reducing scour. This scour slightly whitens the Lycra and reduces the likelihood of fume-yellowing for combinations of Lycra with nylon, rayon, cotton, or Dacron.

The reducing scour also provides a good base white for application of optical whitening agents to fabrics of Lycra with nylon, Orlon, or Dacron. Only the "hard" fibers and not the Lycra are optically whitened.

Dyeing—During the dyeing of a combination fabric, Lycra has the advantage over rubber of having affinity for dyes used on the combination fiber. Although exact unions may be difficult to obtain, the shade on the Lycra is complementary to that of the combination fiber, thereby preventing exposure of undyed yarn during stretching of the fabric.

Lycra spandex fiber has an affinity for most classes of dyes; however, the wash and lightfastness is generally fair to poor. By careful selection of dyes, a range of shades can be developed with acceptable fastness for most end uses. The fact that only a small percentage of Lycra is present in the combination fabric makes it possible to meet colorfastness standards for those fabric types where Lycra is used.

Table 4 lists various classes of dyes and their effect on Lycra.

Only a few direct dyes have affinity for Lycra and their build-up and fastness are not acceptable.

Finishing—Finishing procedures used for elastic fabrics containing rubber can be applied directly to fabrics containing yarn of Lycra. During drying and finishing of fabrics containing Lycra, minimum tensions and temperatures must be maintained to prevent changes in fabric properties.

A look at the record *(from page 65)*

to overstretched yarn on the part of the weaving mill were almost expected in a high percentage of woven fabrics. In this instance one might remark that rayon's black eye came from the shiners, rather than in the usual sequence.

The dyer who succeeded in processing goods without total loss of the rayon, as well as his patience, was not surprised to culminate his delivery of plain dyed goods with an assortment of warp streaks and filling shade bands. In due time improved physical and chemical characteristics minimized the defects attributed to overtensioning in processing and substantially better dyeing uniformity relieved the dyer of some of his headaches.

It was not long before luster modifications, such as semi-dull and dull yarns, were made available, as were finer deniers per filament, specifically 1 denier as compared with early minimums of about 5. Consistent improvements in yarn strength have resulted in the availability today of rayon yarns with dry tenacities as high as 5 grams per denier and wet tenacities of over 3 grams per denier, representing an increase of well over 250% since the early 1900's when rayon first reached the market.

Interesting enough, too, was the fact that the first pigmented or dull rayon yarns were almost impossible to dye evenly, although their bright counterparts had by then become reasonably uniform in their dyeability characteristics.

When they were first introduced, rayon tire cord yarns were sufficiently superior in tenacity

Continued on page 102

Improve Dacron-wool blends

Here are mill solutions to four problems in yarn making and fabric finishing

by Edwin G. Sutcliffe
Chief Chemical Engineer
Samuel Hird & Sons, Inc.
Garfield, New Jersey

Exclusive

DACRON, and specifically Dacron 64, when it first appeared on the stage as a blending fiber with worsted brought with it the usual cast of problems. Perhaps we can here shed some light on four members of the cast.

The question of blending is as old as the worsted industries. In general, blending of top or sliver is performed for any of three vital reasons—and sometimes for all three. Of major importance is the need to level unevenly dyed material. Of almost equal importance is the need to level uneven sliver. Finally, there is the desire to add a particular effect to the blend.

Assuming at this point that the dyeings are above reproach and the desired qualities of the finished product are being satisfactorily supplied by a blend of 55 per cent Dacron 64 and 45 per cent 62s quality wool, the big question reverts back to evenness.

The dissimilar properties of the two fibers at the sliver level practically guarantee a very uneven sliver if the two are treated by the normal operations applied to the blending of dyed wool tops. However, even if all precautions have been taken, each blended sliver will have a definite unevenness measurement.

At this point it will pay dividends to appraise the oil applied to the wool and also that applied to the Dacron top. There does not seem to be available an all-purpose oil; that is, one that gives good drawing properties and, perhaps more important, satisfactory anti-static properties to both fibers. Far greater success has been achieved by the application of an individual oil to the individual fiber immediately after dyeing and before the first blending operation.

It is extremely important that each of the oils should impart anti-static properties to the fiber to which it is applied. This is especially true if static is to be prevented during high speed Pin-Drafter operations. The percentage of oil needed will vary with the operations, but generally speaking an addition of one per cent gives satisfactory results.

TABLE 1. Top Variation, Actual and Theoretical

Sample Top Oz	Ft	h*, In.	Actual Avg Max Variation/ Ft, %	Theor Avg Max Variation/ Ft, %
One End Up				
3.59	76	0.0152	12.7	—
3.57	75	0.0154	13.3	—
3.57	75	0.0154	11.8	—
3.48	75	0.0150	12.2	—
3.63	75	0.0156	13.1	—
3.63	75	0.0156	12.7	—
Two Ends Up				
6.97	74	0.0305	9.02	8.94
Four Ends Up				
14.04	74	0.0614	6.85	6.32
Six Ends Up				
20.90	74	0.0914	5.63	5.16

$$*h = \frac{\text{oz/run} \times 28.35 \text{ gr/oz} \times 95\% \times 1728 \text{ cu in./cu ft}}{\text{ft/run} \times 453.6 \text{ gr/lb} \times 62.5 \text{ lb/cu ft} \times 1.35 \text{ sp gr} \times 0.3125 \times 12 \text{ in./ft}}$$

Width of groove in tester — 0.3125 in.

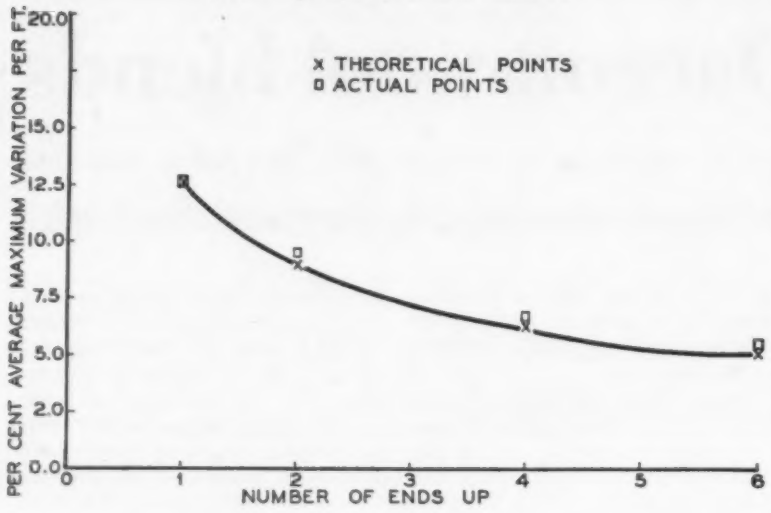
Specific gravity of 55-45 Dacron-wool blend — 1.35

Moisture content of blend — 5%

How Much Blending? Assuming that all precautions have been taken and the two fibers successfully blended, a sliver will now be on hand with a definite value of measured evenness. The type of measurement used in reporting the following development is that obtained from the Pacific Evenness Tester, and the quantity is called the Per Cent Average Maximum Variation Per Foot. It can be obtained by an actual measurement of the maximum variation occurring per foot of top for runs of 72 feet and then averaging and dividing by the calculated or measured thickness of the compressed sliver.

Experience and charting can soon establish a desired norm for this value, which of course varies from plant to plant. The end product—that is, the type of cloth being produced—should determine the control value in each case. However, if it is established that

FIG. 1. Top variation, actual and theoretical



the end product is unsatisfactory because of uneven yarn, this measurement should be carefully studied and revaluated.

The following experimental step was undertaken to determine how much improvement could be expected from various blending operations.

If the top or sliver has a value of (x) for the per cent average maximum variation per foot, and (n) number of ends are blended together to form the new end, the value of the measured quantity will be approached by the following equation:

$$\text{Avg \% max variation/ft of blended top} = \frac{\text{Avg \% max variation/individual end}}{\sqrt{n}}$$

(Equation 1)

To check this, six individual ends were measured on the Pacific Tester, then two of the individual ends were superimposed and run through the tester. This step was repeated with four and finally six ends.

Table 1 shows the data and *Figure 1* the actual values obtained plotted against the theoretical curve found from Equation 1. In this case it is evident that the blending of more than four ends shows very little added improvement; however, the blending of the four ends brought about an improvement of 50%. It is suggested that individual mills set up their own controls based on similar evaluations.

A word of caution is needed at this point. It must be remembered that in the work illustrated the slivers were superimposed and run through the tester but that no work was performed by the machine on the blended sliver. This of course is not the case in actual practice. In practice, at the same time that the four ends are blended, work is performed on the sliver in drafting it out to its original weight or less. It is for this reason that the statement was made that the measured quantity will approach the values obtained by the equation. The curve might be considered to be the ideal or limiting value of the equation.

Effect of Twist. If the drafting has been successfully controlled the next variable appears in the guise of the twist introduced into the roving. The need for twist is self-evident, but frequently the amount of twist and its relationship to successful spinning is not quite so obvious.

It does not necessarily follow that the stronger the roving the better the spin, nor is the reverse true. In actual practice there appears to be a range of tensile strength values giving good results in spinning, but when the range is exceeded at either end trouble ensues. *Table 2* and *Table 3* illustrate the relationship existing between turns per inch in roving and the mean tensile strength of roving when the dry weight of the roving is held constant. *Table 2* is for 100% worsted, *Table 3* is for a 55% Dacron 64, 45% wool blend.

The ends-down count of the 100% wool yarn gives a clear picture of the success of the spin; unfortunately this does not follow through into the Dacron picture. The strength of the Dacron yarn is such that the ends-down picture is excellent over the entire range but the yarn produced from the strong roving is extremely uneven. Results of this type are especially disastrous, as proved by the appearance of the finished cloth.

The data presented in *Table 2* and *3* are plotted in *Figures 2* and *3*. The interrelationship of the various characteristics become apparent from the study of these plots.

Figure 3 (Dacron-wool blend) shows that no clear-cut relationship exists between ends down and twist, since the points are those of a scatter diagram. However, there is a definite break in the evenness as the turns per inch exceed 1.1.

Figure 2 (100% wool) demonstrated that best performance is achieved with turns per inch between 1.0 and 1.15. This is true for both ends-down data and evenness.

Finishing. In the finishing room a precaution sometimes overlooked pertains to the production of the clear-face finish so desired at present. If the plant has been predominantly on 100% wool, a great deal of sorrow can be avoided if the singeing operation is eliminated on the Dacron-wool blend. The clear-face will have to be approached through closer shearing.

If the singe is used, the small protruding Dacron fibers melt and small balls develop at the ends, with a subsequent loss in hand of the finished material. In some cases, if the singe is deemed essential, singeing after shearing will be less harmful to the feel of the finished cloth.

A final problem discussed in this report concerns the production of a durable anti-static finish. Until recently this seemed unattainable but a new development seems to have overcome this

stumbling block. An actual mill run was made using this formulation:

	%
1.25 lb Neutronyx 600	0.38
1.25 lb Eponite 100	0.38
14.6 lb Aston 123	4.40
38 gal water	94.84
300 ml conc muriatic acid	—

The solution was made up by adding the Neutronyx to the Eponite, stirring well; then with continued stirring adding approximately one-fourth the volume of cold water. Next, Aston is added with continued agitation and enough water to bring the volume to half the final value. At this point the pH of the solution is checked and adjusted, in the above case to 6.2, by the addition of 300 ml of concentrated commercial muriatic acid. Finally the remainder of the cold water is added.

The run was made by transferring the above solution to the dip tank of a padder arranged before the conventional shrinker dryer. The pick-up amounted to 1.2 times the dry weight of the cloth. After the pad the material was processed through the dryer at a temperature of 250 F. From this point on the cloth followed the normal processing procedures.

Test runs made on this material against an untreated blank show the sample now stands better than 15 dry cleanings without appreciable change in its anti-static properties, while the blank shows a strong tendency to develop static charges.

TABLE 2. Effect of Twist on 100% Worsted

Roving			Yarn	
TPI	Dr/40 Yd	Str Lb	Ends Down/ 1000 Sp Hr	Avg Max Variation/ Ft, %
1.250	6.52	0.91	64	45.5
1.215	6.70	0.87	70	44.6
1.185	6.54	0.74	36	44.0
1.125	6.64	0.54	30	43.6
1.071	6.59	0.41	32	44.0
1.000	6.69	0.30	30	45.4
0.957	6.61	0.26	40	46.6
0.901	6.50	0.24	44	47.5

TABLE 3. Effect of Twist on 55-45 Dacron-Wool Blend

Roving			Yarn	
TPI	Dr/40 Yd	Str Lb	Ends Down/ 1000 Sp Hr	Avg Max Variation/ Ft, %
1.250	6.95	2.00	18.0	59.0
1.215	6.80	1.68	24.0	61.0
1.185	6.78	1.40	16.0	58.0
1.125	6.87	1.00	14.0	45.0
1.071	6.92	0.82	18.0	43.0
1.022	6.90	0.70	21.0	43.0
0.957	6.85	0.60	20.0	45.0
0.901	6.90	0.58	19.0	44.0

Product Sources
Aston 123 — Onyx Oil & Chemical Co.
Dacron 64 — Du Pont Co.
Eponite 100 — Shell Chemical Corp.
Neutronyx 600 — Onyx Oil & Chemical Co.
Wool — Any good-natured sheep

FIG. 2. Effect of twist on 100% worsted

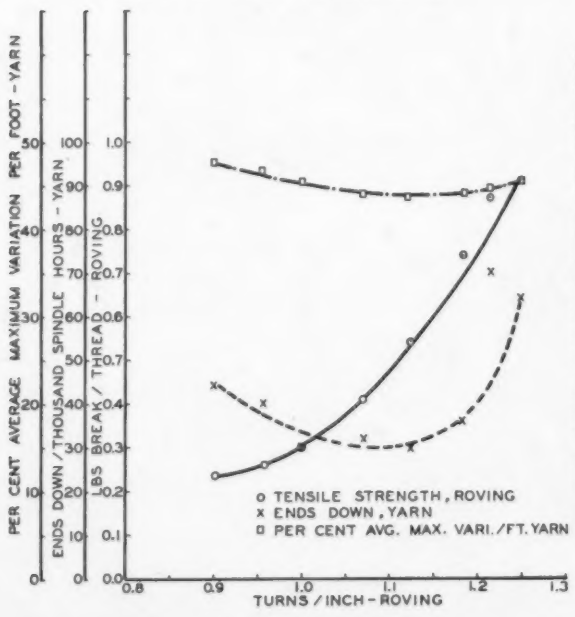
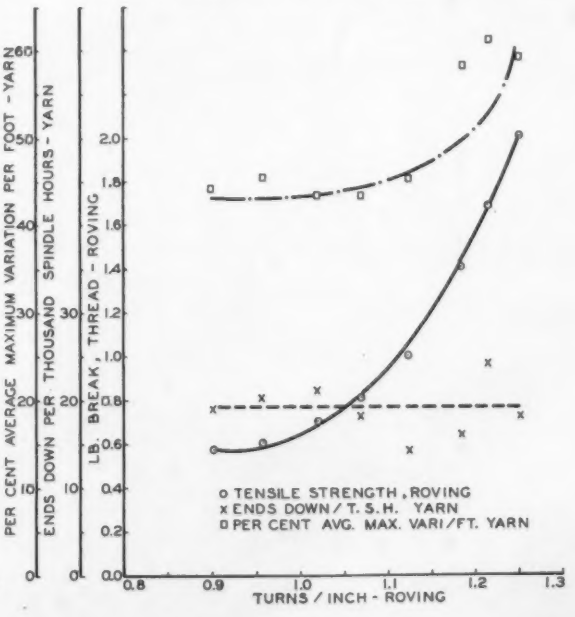

PER CENT AVERAGE MAXIMUM VARIATION PER FOOT - YARN
ENDS DOWN / THOUSAND SPINDLE HOURS - YARN
LBS BREAK / THREAD - ROVING
o TENSILE STRENGTH, ROVING
x ENDS DOWN, YARN
□ PER CENT AVG. MAX. VARI./FT. YARN
TURNS / INCH - ROVING

FIG. 3. Effect of twist on 55-45 Dacron-wool blend


PER CENT AVERAGE MAXIMUM VARIATION PER FOOT - YARN
ENDS DOWN PER THOUSAND SPINDLE HOURS - YARN
LB. BREAK, THREAD - ROVING
o TENSILE STRENGTH, ROVING
x ENDS DOWN / T. S. H. YARN
□ PER CENT AVG. MAX. VARI/FT. YARN
TURNS / INCH - ROVING

Staff prepared Exclusive

IN LOOKING at the operating history of Lisbon Textile Prints, Inc., it is quite clear that one management policy in particular has been responsible for the company's growth. This policy has been a willingness to meet market trends with the required facilities and printing techniques.

In the past, the drapery markets which Libson has been serving as a commission screen printer have seen only gradual change. But in recent years, new developments in fabrics and colors have been coming along at a fast rate, requiring a much more flexible operation. Nevertheless, at any period in its history, there has always been a predominant operation or specialty which has accounted for most of the plant's output.

More than 15 years ago, when the company was formed in Lisbon, Conn., printing cotton for the Madison Avenue markets became Lisbon's first specialty. Ray Andersen, Sr., founder and president, brought with him long experience in applying fast colors to cotton fabrics. Several years later, as emulsion pigment printing systems were perfected, Lisbon followed the trend to satisfy the particular markets that it was then serving.

During this time, the company began to grow and diversify, installing facilities for dyeing and finishing on a small scale. By 1958 it became evident that additional space would be needed. While the plant had been adequate for an original operation consisting of six tables, it would not do for further growth and diversification. When Wauregan Mills in the nearby town of Wauregan ceased operations, management leased about 40% of the space, which has been ideally suited for screen printing and finishing.

At about this time, too, Lisbon began to experiment with techniques of printing on fabrics of fiber glass. Such fabrics were being developed for use in the drapery field, particularly where fire resistance and ease of maintenance were required. Since glass fabrics require delicate mechanical handling without flexing, hand screen printing proved a most satisfactory method. Working closely with Owens-Corning Fiberglas Corp. and various pigment manufacturers and formulators, Lisbon in time mastered a printing technique and assembled a simple finishing unit for rapid fixation of the pigments.

Today, printing on glass fabrics is the specialty at Lisbon. Though this technology is quite simple, it calls for exactness in color formulation and preparation, and a great deal of skill in color matching besides. Furthermore, with Lisbon's emphasis on high productivity, the operation calls for a close coordination of the various screen printing routines, as will be seen.

Emulsion Is the Key. Perhaps the most important key to successful printing on glass is the make-up of the pigmented emulsion system, which is a water-in-oil paste. It must be of suitable viscosity for printing, without clogging the screens, and it must dry quickly for immediate overprinting. Much work went into

Hand screening is the most popular method of printing glass fabrics. During printing, the fabric is stationary and is not subject to any injurious pressures or flexing actions. Lisbon Textile Prints, Wauregan, Conn., has specialized in this operation for over four years. The plant has fifteen tables with a total printing surface of 1,000 yards. Around-the-clock operation makes for high output.

This printer's policy is to meet style trends in the drapery market. Right now its specialty is

PRINTING GLASS FABRICS

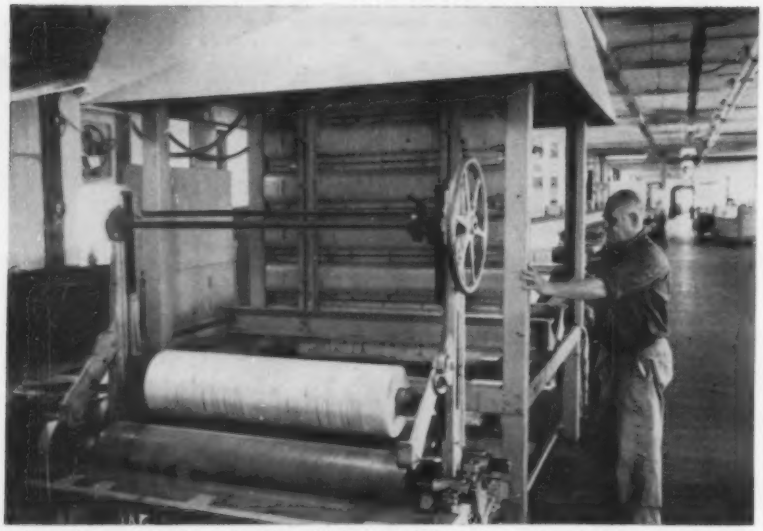
the development of a printing system to obtain trouble-free printing and good performance in end usage. All production is sampled and tested under a quality control program carried on by Owens-Corning Fiberglas.

The glass fabrics as they arrive at the plant are already suitable for printing. They are laid out carefully on the tables and printing is immediately begun. Since the colors are quick drying, overprinting is possible without danger of pulling off previously applied colors. When the final color has been printed, a crew of two begins to lay out another length of fabric underneath to save time while the prints on fabric above are drying to completion. This technique accounts for a higher production. Thus, the cycle consists of laying out the fabric, followed by immediate printing without a waiting period for drying between color applications, and lastly, stripping of fabric off tables.

Lisbon today has 15 tables for a total printing surface of 1,000 yards. While at present these tables are heavily engaged in

Rigid quality control program assures shade uniformity. Here Lisbon's colorist checks production run against standard. Shade may be checked as many as 20 times in 6,000-yard run.

Water-in-oil emulsion pigments are used exclusively. Pastes must be quick drying for immediate overprinting without pulling off.



After printing and drying (on the table), the fabric is framed to width and passed continuously between two banks of radiant heating elements (see close-up view in photograph at right), where the colors are fixed in a matter of seconds at a temperature of 900 F.

fiber glass printing, they can and are being utilized for all types of screen printing on numerous other fabrics. The table surface is of plain felt, covered with an adhesive suitable for keeping glass in a stretched condition. Most panel patterns average between four and seven colors, in repeats of 70 to 132 inches. While the methods and systems used at the Lisbon plant are proving successful in the panel printing field, they also have been found successful in printing other types of drapery patterns and materials which can be screen printed.

Close Shade Control. Many precautions are taken during printing to assure uniform shading, because conditions can change to influence shade. Therefore, a quality control program has been established which calls for periodic inspection of shade, and of course requires a colorist skilled in the art of color matching. Here are some conditions that require correction to maintain shade uniformity.:

1. Screens can become clogged to change amount of color passing through screen.
2. Screens become worn from prolonged usage.
3. Viscosity changes allowing more or less color to pass through screen.
4. Colors tend to gel under heat and thus clog the screens.
5. Pressure exerted on squeegees varies from beginning of shift to day's end as operatives become progressively tired.

These conditions are well recognized by the Lisbon management and a strict color matching routine is followed to prevent or detect changes in shade. On a 6,000-yard run, for example, the shade may be checked against a standard as many as 20 times, and adjustments made in color formulation or in printing techniques if required. Such frequent inspection, Lisbon management feels, is the only assurance of quality.

After printing and drying of colors (on the table), the fabric is tentered and then passes continuously through two banks of radiant heating elements where the pigments are fixed in a matter of seconds at a temperature of 900 F. The tenter frame must be in good mechanical condition at all times, with the clips working properly, to prevent bruising of the glass fibers. In the final step, the fabric is inspected carefully

Continued on page 100

While at present Lisbon is heavily engaged in panel printing, such as this mural, it is at the same time printing all types of patterns on rayons, cottons, acetates, and silks.

Overseas man-made fiber developments

A review of recent foreign achievements and future prospects in the industry abroad

by R. J. Richardson and G. D. Wilkinson
Applications Research and Service Department
The Chemstrand Corp.

Exclusive

BECAUSE of the numerous overseas developments in synthetic textiles, this review of recent foreign achievements and future prospects in the industry abroad must necessarily be superficial. Some of the developments were to be expected because of pioneering in certain countries with certain fibers, e.g., polyesters in Britain or polypropylene in Italy. Other developments are more or less novel, though rarely over the past two or three years has a new fiber appeared in one country only.

The most far-reaching introductions into man-made textiles in recent days have been the new textured yarns and the profiled fibers, which were brought to commercial exploitation in a relatively short time. Such fibers as polyolefins, especially stereospecific polypropylene, and new polyamides are in an advanced development stage but their large-scale commercial acceptance has yet to come, even in the countries of origin.

Virtually all the fibers or processes to be discussed in further detail below are being actively investigated in this country and omission of reference to American work does not in any way imply lack of recognition but only that it does not fall within the scope of this article.

Polyolefins

Although polyethylene was first prepared in England (I.C.I.) in the 1930's, its use in textiles was limited until the coming of the Phillips and Ziegler low-pressure processes, which yielded polymers of much greater crystallinity and less branching and having considerably improved physical properties. These could be meltspun and, despite certain disadvantages such as low melting point, the need for spin-dyeing, and a tendency to degrade in sunlight, have found increasing application, particularly because of the relatively low price.

The most significant, recent development with polyolefins was the discovery by Professor Guilio Natta of the Milan Polytechnic Institute of stereospecific polymerization of propylene. Polymers with a predetermined "chemical shape" as well as composition can now be manufactured (the method, indeed, has been found to have general applicability in polymer chemistry). The regularity of the propylene (and butylene) isotactic polymers that can now be made results in improvements in certain physical properties and Montecatini is attempting to exploit these in Italy.

Total production of polypropylene staple and monofilament in Italy is soon expected to reach 10,000 tons per year. The Montecatini Co. has patents in many overseas countries covering a very wide variety of end-uses, from sacks to fine hosiery, and has recently claimed to have solved the dyeing problem.

Polypropylene fibers are receiving widespread attention elsewhere in the world, notably in England, Japan, and Germany. Manufacturers in several other countries have patents on polyolefin polymerization processes.

The chief advantages claimed for polypropylene fibers are light weight, enabling them to float in water and giving them greater covering power, weight for weight, than any other fiber; and high strength.

Rumors of over-capacity in polyolefin production plant are becoming increasingly common both in the U. S. and Japan. In the latter country the government is considering restrictions on new installations.

The market potential for polyolefin textiles is seriously limited by heat sensitivity and lack of dyeability.

Polyamides

Additions or modifications are being made regularly to the family of polyamides, so long dominated in many countries by the 6,6 variety. Whether, apart from nylon 6, any new polyamides will ever challenge the pre-eminence of nylon 6,6 is impossible at present to say. Overseas polyamides developments are outlined

below in "numerical" order.

Nylon 6. The use of nylon 6, which was brought to an advanced position in Germany during World War II is becoming more widespread and is receiving special emphasis in Japan (and the United States).

Nylon 6, known by the trademark Perlon in Europe, is made by the polycondensation of caprolactam. The raw materials, phenol and hydroxylamine, are readily available. The softening point of Perlon is lower than that of nylon 6,6. Perlon has been suitably modified in Germany to improve its thermal properties, especially its endurance, and, in some cases, has greater dyeing affinity than ordinary nylon 6, 6.

Its weathering properties, too, superior to those of the older types are claimed to be now slightly of nylon 6, 6; it is certainly more resistant to ultraviolet light than the nylon 6, 6 of a few years back. As the German technological background becomes more widely known, increased exploitation of the properties of Perlon is very probable, especially if it can be made more cheaply than nylon 6, 6.

The Czechs claim to have been operating a continuous process for making nylon 6 fibers from caprolactam for 10 years and maintain that is was developed without any reference to German experience. The product, Silon, is made from caprolactam polymerized in aqueous solution. This reportedly makes the water content of the final fibers difficult to control and thus unsuitable for tire cord.

The Poles say that they are making their own nylon 6, Steelon, by an exclusively Polish process at a rate which should reach 12,000 tons a year by 1965. The Soviet Union produces 20-30 million tons a year of nylon 6 by a continuous process. The starting material is cyclohexanone, which is converted to the oxime by treatment with ultraviolet light and nitrosyl chloride. The oxime rearranges to caprolactam, which is continuously polymerized in the presence of a sodium catalyst. An analogous process is used in Japan by Toyo Rayon with cyclohexane as the starting material.

In Italy, Snia Viscosa has devised a process for preparing caprolactam from benzoic acid and toluene (replacing the more costly phenol) and in 1960 doubled its production of Lilion, as nylon 6 is known there. This process has also been licensed for use in Japan, although Toyo Rayon claims that its process is less expensive than Snia Viscosa's.

Work has been going on in East Germany with copolymers of caprolactam and hexamethylene diamine adipate, i. e., Perlon/nylon 6,6 copolymers. These are called Trelons. An F. Trelon has been noted in the literature; it contains 10% polymerized caprolactam and melts at 238 C.

In West Germany attention is being given to blends of nylon 6 and nylon 6, 6, which have excellent compatibility. If the different dyeing responses of the two fibers are utilized some striking two-tone effects can be realized.

Nylon 7. Nylon 7, a derivative of aminoenanthic acid (or aminoheptanoic acid), has been brought to a useful fiber polymer in Russia, where it is called Enant.

The fiber is manufactured from ethylene and carbon tetrachloride, from which a chlorinated hydrocarbon telomer is made. Acid hydrolysis of this, followed by treatment with ammonia, yields the amino acid from which the polymer is formed by condensation from the lactam.

The properties of nylon 7, which have been looked at only experimentally outside the Soviet Union, do not make it a dramatic entry into the man-made fiber field. Its physical properties fall, generally speaking, between those of nylon 6 and nylon 6, 6. Its main chance of success seems to depend, like Perlon, on the simplicity of its manufacturing process and the strategic supply and cost of its raw materials.

On the other hand, the general applicability of the telomerization reaction to the production of polyamides (see nylon 9 and nylon 11 below) could have very great significance in the future.

Nylon 9. By applying the telomerization reaction under slightly different conditions, Russian scientists have prepared aminopelargonic (aminononanoic) acid from the lactam of which nylon 9, or Pelargon, is obtained. Whether or not this fiber will attain any industrial importance is as yet unknown.

Nylon 11, or Rilsan, was developed in France by the Organico Co., working in collaboration with the Italian firm of Snia Viscosa. It is made in appreciable quantities as continuous filament and staple fiber for a wide variety of apparel uses and is also being employed now in stretch fabrics. It is claimed to have a softer hand than nylon 6, 6. It has rapid drying characteristics (making it suitable for ease-of-care fabrics), good chemical resistance, and covering power, its density being only 1.04 grams/cc. It melts, however, below 190 C.

Its raw material is castor oil, from which it is made by the following steps: castor oil (85% glycerol tri-ricinoleate) is subjected to alcoholysis with methanol, and the glycerol and methyl ricinoleate formed are separated; the latter compound is pyrolysed to give heptaldehyde and methyl undecylenate. The latter compound is hydrolysed (which enables the methanol to be recovered) to undecylenic acid, treatment of which with ammonia yields w-aminoundecanoic acid. This polycondenses on heating to nylon 11.

The factor militating most against the general introduction of Rilsan (apart from certain undesirable physical properties) is the fluctuating price of castor oil, which is much more variable than materials derived from such a mineral product as coal-tar or petroleum.

The Russians have, however, successfully applied the telomerization reaction in the production of aminoundecanoic acid and this, by removing dependence on castor oil as a starting material, may make Rilsan a more formidable claimant for a leading position among the polyamides.

Nylon 12. The "accidental" discovery of nylon 12 by G. Wilke at

the Max Planck Institute for Carbon Research was announced in February 1961. The new polymer is being investigated by Chemische Werke Huls, who are using Wilke's method to obtain dodecanolactam, the immediate precursor of the polymer.

The fiber made from the polymer is said to have some properties superior to those of nylon 6 and nylon 11.

Other Polyamides. Other lines of study which could lead to interesting new fibers include Latvian work with a piperazine polyamide which has properties somewhere between those of the polyamides and the polyesters; Russian work with high-temperature polyamides made from dicarboxylic acids containing phosphorus and aromatic nuclei, and from thiodicarboxylic acids; and Japanese work on fibers based on a copolymer of e-caprolactam and aminotriazole or triazole (the triazole copolymers were easily melt-spun).

Finally, British Nylon Spinners have patented a polyamide based on hexamethylene diamine (like nylon 6, 6) and mucic acid. The polymer, because of the extra OH groups conferred by the mucic acid, could well have special comfort and dyeing properties but it has so far made no commercial appearance.

Textured Yarns

Helanca. The original Helanca process, i.e., that of texturing a multifilament yarn by separate steps of twisting, heat-setting, and untwisting, was developed and patented by Heberlein & Co. A. G., Wattwil, Switzerland, and used as early as 1932 in the production of bulked rayon yarn.

Since that time, the trademark "Helanca" has become well known, particularly in textured nylon yarns, and is used to describe a whole family of textured yarns of both the conventional and false-twist types. This family includes two stretch types, i. e., Helanca Firm produced by the conventional method; and Helanca Soft, which is a false-twist stretch yarn formerly simply called Helanca.

Post-treated versions of Helanca —that is to say Helanca yarns whose stretch properties have been modified to different degrees of bulk with limited stretch— include:

1. Helanca Smooth—used for knitted outerwear where a clear stitch is required, combined with a soft, smooth hand and good cover.

2. Helanca Thicknit—which is really Helanca Smooth yarn plied up into coarse deniers for chunky knits and similar constructions.

3. Helanca Bouclé — used for fabrics where a matt, soft hand and pronounced surface cover are desired.

4. Helanca-Set—latest addition to the Helanca family. This is a nontorque bulk yarn, claimed to be dimensionally stable and to permit garments to be knitted approximately to size with minimum relaxation shrinkage during finishing. It is interesting to note that Helanca-Set was developed by John Heathcoat & Co. Ltd, Tiverton, England — Heberlein's sole licencee in Great Britain. The yarn has already been used in large quantities for underwear. Its main outlet will almost certainly be knitted outerwear and jersey dresses, suits, etc.

False - Twist - Type Textured Yarns. The false-twist method for texturing yarns was invented by Finlayson and Hoppey of British Celanese Ltd. around 1933 and was used by that company for the production of cellulose acetate voluminous yarns for eleven years.

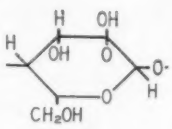
In more recent times, the false-twist principle for producing stretch yarns—because of its economy — has engendered tremendous development all over the world culminating in such well known false-twist-type yarns, in England alone, as:

Amatolon (Mutual Mills Ltd.)
Courtolon (Courtaulds Ltd.)
Deblon (Debonair Ltd.)
Depafil (British Depa-Crepes Ltd.)
Depalon (British Depa-Crepes Ltd.)
Shawflex (John Shaw & Sons (Yarns) Ltd.)

And post - relaxed false - twist types such as:

Astralon-C (British process licensed outside U. K.)
Astralene-C
Courtolon X-10, X-20, X-30, and C-10 (Courtaulds Ltd.)
Deboir (Debonair Ltd.)
Depoloft (British Depa-Crepes Ltd.)
Elsalon (Lancashire Cotton Corporation)
Helanca-Set and other Helanca types (Heberlein A. G.)
Kirklon (Kirklees)

Cellulosics



The arrival of the new synthetics, polyamides, polyesters, and acrylics had a pronounced effect on the traditional markets of viscose rayon and cellulose acetate fibers. The response of cellulosic-fiber manufacturers to the new fibers has been vigorous. Several new varieties of cellulosic fiber produced in the last decade have properties much improved over those of cellulosics previously available.

Some confusion over the identity and nomenclature of these modified cellulosics was probably inevitable, though it is doubtful whether all of it was strictly necessary. An account of the more significant new cellulosics abroad follows.

Viscose. Before the last World War the Tachikawa Research Institute in Japan pioneered work on reconstituted cellulose in which the molecules were closely and uniformly aligned in the fibers produced, so that the structure was closer to that of cotton or flax. The Union des Fabriques Belges de Textiles Artificiels S. A. (Fabelta) in Belgium in collaboration with Compagnie Industrielle de Textiles Artificiels et Synthetiques of France and Viscose Suisse of Switzerland brought the Tachikawa concept to a commercial reality, in the shape of "Z 54" fiber, some two years ago. It is

known as Scaldura in Belgium and Meryl in France.

The average degree of polymerization of cellulose in the modified rayon is over 500 whereas former rayons had a degree of polymerization of less than 300. One important contributory factor in the production of such fibers is the careful selection of raw cellulose (from cotton linters or wood pulp) to ensure a long chain length from the start. Because of the better packing of the fibrils, penetration by swelling agents is much less than before and the wet strength, previously one of rayon's chief drawbacks, has been raised appreciably.

Some 10 years ago the Japanese themselves applied the Tachikawa principle to Toramomen, a viscose rayon produced for almost 10 years in the old form; and similarly modified viscose has been made in the U. S. by Courtaulds (SC 28) and by the Hartford Fibres Co. (Zantrel), who licensed the process from the Franco-Belgian group mentioned above.

These high-wet-modulus fibers (as they are sometimes styled) have good stability, low initial shrinkage, and virtually no progressive shrinkage. The hand is improved but still closer to that of viscose staple than of cotton. Strengths are good enough for apparel uses, although abrasion resistance could be better. The fibers can be mercerized, compressively shrunk, and given effective crease-resistant finishes.

Two other items on viscose have recently been reported from overseas. One is the first 100% lubricant-free synthetic fiber, which is a crimped viscose called Floxan made by Vereinigte Glanzstoff-Fabriken in Germany. The other is a high resilience, fire-resistant rayon called Elaston, made by Svenska Rayon in Sweden. It is used in knitted and woven fabrics and in pillow fillings.

Cuprammonium Rayon. By modifying the coagulating process, especially the bath composition, J. P. Bemberg AG. in Germany has been able to produce a cuprammonium rayon free of copper and suitable for use in tire cord. The dry tenacities of the new yarns range from 3 - 5 grams/denier and the wet from 2 - 4 grams/denier. The elongation at break is 5 - 12%.

Cellulose Acetate. The first cellulose acetate produced by acetylation in the fiber form and not solution-spun was made in Japan 3 or 4 years ago. The advantage of the technique is the elimination of expensive solvents and preservation of fiber form. The viscose staple is acetylated with acetic anhydride vapor to an amount equivalent to 2.2 acetyl groups per glucose residue (close to secondary acetate).

The dry tenacity of the new fiber, Alon (or Tohalon), is twice that of ordinary acetate, triacetate, or wool, and closer to that of the acrylics. The wet tenacity is 80% of the dry tenacity. Alon has a low density, below cotton or rayon. The solvent resistance is good. The moisture regain of Alon is slightly below that of secondary acetate and detracts somewhat from its appeal for apparel uses. It has no distinct melting point and does not lose tensile strength or break down chemically at 130 C in water under pressure. This heat resistance is comparable with triacetate and is a definite advantage when dyeing blends with other fibers requiring high temperature dyeing and also in domestic ironing.

Another claim made for Alon by its manufacturers, Toho Rayon, is its freedom from pilling. The hand of Alon has been assessed by an independent authority (R. W. Moncrieff, *Textile Mfr.*, December 1959), who says it is closer to that of triacetate than to that of secondary acetate.

The low cost of Alon (67¢ a pound in Japan in 1960) is a very great commercial advantage, as is its high tenacity. Its future depends on the response it receives from processors and consumers.

Profiled Fibers

Fibers with cross sections other than round or elliptical have been laboratory curiosities for some time, but their introduction on a commercial scale is quite recent. In the U. S., polyamide fibers of multilobal cross section—so far the most interesting—have enjoyed a ready acceptance.

Research into profiled fibers is going on around the world.

Protein Fibers

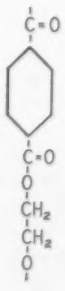
The pedigree of the protein fibers dates back to the beginning of the 20th Century, but their success has been limited and greatly overshadowed by the true synthetics. They can be subdivided into two classes, those of animal origin and those of vegetable origin.

The earliest commercial protein fiber, Lanital, was made in Italy in 1937 by Snia Viscosa and was based on casein (milk protein). Improvements have since led to a new casein fiber called Merinova, also made by Snia Viscosa. Courtaulds in England also market a casein fiber, Fibrolane BX.

Casein fibers are used almost exclusively in blends with wool, where they improve the felting properties and provide a non-detrimental "diluting agent" of low cost. The use of casein fibers is thus controlled very largely by the price of wool.

The vegetable protein fibers have been conspicuous for their lack of success, both here and abroad. Ardil was a peanut fiber developed in England by I. C. I. in 1938 and made on a commercial scale after the last World War. In 1957 it met with the same fate as Vicara, the American corn-protein fiber. Both were discontinued for economic reasons at almost the same moment.

Polyesters



In contrast with W. H. Carothers' early unfavorable results with polyesters derived from aliphatic acids, Whinfield and Dickson of the Calico Printers Association in England found in 1944 that polyesters prepared from certain aromatic acids had properties

eminently suitable for fibers. Production was begun in 1947 and the commercial success of the polyester fiber has been dramatic and complete.

By far the commonest polyester fiber is that based on terephthalic acid and ethylene glycol. It is known by many different names throughout the world: Terylene in Britain, Dacron in the U. S., Trevira in Germany, Tergal in France, Tetoron in Japan, and Lavsan in Russia.

While several minor modifications, such as surface treatments, have been made in polyester fiber since its inception, no really great changes have become apparent in the fiber during its short history. (The super-stretching property has yet to be fully utilized.)

Polyesters with particularly high tenacities have been produced by Farbwerke Hoechst in Germany. They are suitable for ropes and hoses.

Nevertheless, research has been directed in various countries, notably Britain, Japan, Germany, and Russia, towards producing new polyesters in the hope that they will prove to have some novel, desirable characteristics. The melting points of polyesters produced from ethylene glycol and diphenyl dicarboxylic acids are higher, for example, than that of terephthalic acid polyester, but the differences are not sufficient incentive to introduce them on a commercial scale.

In Britain, attention has been given to the easier dyeing of polyesters by such devices as adding polyethylene glycol to the polymer or incorporating up to 1% of nitrogen into the molecule by means of certain pre-polymerization additives.

A polyester fiber with improved properties (tensile strength, elongation at break, heat resistance) has been prepared in Japan by Kokoku Rayon & Pulp Co., Ltd., based on copolymers of 3 - methoxy - 4(B-hydroxy-ethoxy) benzoic acid or its methyl or ethyl esters with 4-(B-hydroxy-ethoxy) benzoic acid or its methyl or ethyl esters.

Some of these experimental fibers may one day prove to be important additions to the polyester class.

Graft Fibers

The modification of polymers by grafting different monomers along the chain (after the manner of a herring bone or feather) owes its beginning to atomic chemistry, where nuclear radiation was used as the promoting energy for the reaction. Grafting can also be performed chemically with or without the help of utraviolet light. A wide range of polymer curiosities has been made in the laboratory by the grafting technique but, because of the uncertainties in the process and the high cost (of radiation grafting, at least), it has had very little impact on the textile industry at the commercial level.

Apart from the U.S., countries where graft fibers are being studied include Japan, Britain, France, Germany, and Russia. Only in Japan are grafted fibers offered commercially. These are the Jubilan series made by Dai Nippon Spinning Co. The original Jubilan, now Jubilan R, is rayon staple to which acrylonitrile monomer has been grafted. The fiber has wool-like qualities similar to the acrylics.

Jubilan R is normally used in a 30%/70% rayon blend. The blend is used in yarn-dyed shirting materials, printed muslin, hosiery, underwear, and blankets. The printed muslin, especially, has outstanding dyeability, washability and hand. Daily production of Jubilan R is now 20 tons, having been doubled in April this year. It is also made by the Nichibo Company in Japan. Other acrylonitrile-grafted fibers are Jubilan V (Vinylon-based), Jubilan C (cotton-based), Jubilan W (wool-based), and Jubilan S (silk-based).

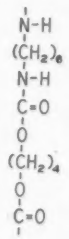
From England has come a report of grafting methacrylic acid on nylon by an irradiation method to modify the electrical properties of the fiber and lower its solubility in common nylon solvents. Work has also been done in England on grafting acrylonitrile to Terylene, nylon, and polyacrylonitrile itself. These are but a few in a series of examples of interesting fiber modifications which have been reported from many sources. The dyeability of polyolefins (q.v.) has been improved by acrylic-acid and other grafts (Montecatini in Italy) and the heat resistance of nylon 6,6 ameliorated by maleic-acid grafts followed by treatment with salts of weak acids (U. S. A.).

Grafting might, indeed, offer a way of obtaining truly permanent finishes because the grafted substance is attached to the polymer or polymer surface by chemical bonds. Some work on the radiation grafting of styrene to nylon 6,6 and Terylene to improve water repellency has been reported from Canada.

More fundamentally, French experiments have shown that polyvinyl chloride can be made more miscible with polyacrylonitrile by radiation-grafting acrylonitrile on the PVC before mixing the two polymers. Such techniques could have important repercussions for melt-spun polymers.

Grafting on polymers is a relatively new discovery and is still expensive to apply. When more work has been completed on the basic principles of grafting so that its effects are more predictable—and if application costs can be reduced—it will have a valuable contribution to make.

Polyurethanes and Polycarbonates



The polyurethanes are very close in polymeric composition to the nylons, except that they have oxygen linkages in the molecular backbone like the polyesters. (Polyurethanes can be considered as polyesters of the hypothetical amino acid, carbamic acid.)

The polycarbonates are derivatives of aromatic carbonates such as diphenyl carbonate, and are structurally comparable with the polyesters or the polyurethanes. Whereas the polyurethanes are aliphatic and have oxygen and nitrogen linkages, the polycarbonates are aromatic (like the polyesters) and have carbonate (-O-CO-O-) linkages.

Polyurethane fibers were produced in Germany as Perlon U

during the last World War but their commercial success has been limited, especially as they showed no advantages over nylon and, in some respects (stiffness, dyeability, moisture regain) were inferior to it. A resurgence of interest in polyurethane fibers has been brought about by the development of spandex fibers, such as Lycra and Vyrene, in the U. S.

The Japanese use the locally cheap materials, whale blubber and rice, to produce nonamethylene diamine and urea for their polyurethane fiber Urylon, made by Toyo Koatsu Co. Urylon has recently been blended successfully with wool (Shikishima Spinning Co.). There have been reports of polyurethane tire cord from Europe but, as far as is known, no immediate plans exist for introducing it commercially. Pirelli Lastex in Italy is to produce a polyurethane elastic yarn, called Vairin, which is oxidation and abrasion resistant. It is based, however, on American patents held by U.S. Rubber.

The Japanese have begun making polycarbonate fibers (Teikoku Rayon Co.) although H. Schnell of Farbenfabriken Bayer in Germany recently reported that, while polycarbonate fibers possess many of the properties of existing synthetics, they exhibit no new properties and their price at present is prohibitive.

Quite clearly, with the exception of the spandex fibers, the future of polyurethanes and polycarbonates in textiles is extremely uncertain; only time will tell if they merit introduction on anything but a specialty scale.

Polyvinyls

CH_2-CH
OH

Strictly speaking, the title "polyvinyls" applies equally to all polymers derived from the polymerization of monomers containing the vinyl bond,

$$CH_2 = CH-$$

Thus polyacrylonitrile could be considered as polyvinyl cyanide, and acrylic acid might be called vinylic acid (a chemical misnomer). The term polyvinyl, however, is generally reserved for polyvinyl alcohol (and its acetalized or formalized forms), polyvinyl chloride, and other more exotic polymers produced from complex monomers containing the vinyl group, though sometimes it embraces the vinylidene compounds which are disubstituted vinyls.

Polyvinyl chloride has the distinction of being the first truly synthetic fiber and was originally patented as such by F. Klatte (Fabrik Griesheim Elektron) in Germany in 1913. As PeCe, the chlorinated version of PVC achieved some success in Germany during the War but its low softening point (100 C) has precluded very extensive use in textiles. It has good flame resistance (hence its popularity for flying suits) and chemical stability. A fluorinated PVC has lately been announced in Japan.

After the War, Badische Anilin und Soda Fabrik (BASF) produced PCU which is an unchlorinated PVC fiber with good flame-resistance but severe shrinkage at 75-80 C. Other unchlorinated PVC fibers which have enjoyed considerable success in Europe, because of their low flammability and good degradation and rot resistance, for furnishings, filter cloths, fishing nets, and protective clothing, are Rhovyl, Fibravyl (Rhovyl staple), Thermovyl, Isovyl, Retractyl, and Crinovyl in France, Tevilon in Japan, and Khlorin in the Soviet Union.

The possibilities of polyvinyl alcohol fibers have been most thoroughly explored in Japan where they are produced in large quantities by wet-spinning from aqueous solution, as Vinylon or Kuralon. Vinylon, which is often stabilized by treatment with aldehydes (which reduces the number of hydroxyl groups), is used as a continuous filament or staple fiber. End-uses include rainwear, swimwear, sewing thread, knit goods, paper, and nonwoven materials.

The textile properties of Vinylon are generally good, although the softening point (200 C) is a little low for some purposes. The fiber dyes well and has a moisture regain of 5%, which helps the comfort properties of Vinylon fabrics. The wet softening point is low (101 C) and this is some disadvantage in processing. The low elongation (15-17%) makes Vinylon suitable for cotton blending.

One leading Vinylon producer, Kurashiki Rayon Co. has developed a high-temperature, melt-spun, highly oriented polyvinyl alcohol, known as Vinal FO, with properties which suggest its use in tire cord. (It has a yarn strength of 7 grams/denier and can withstand temperatures up to 190 C.)

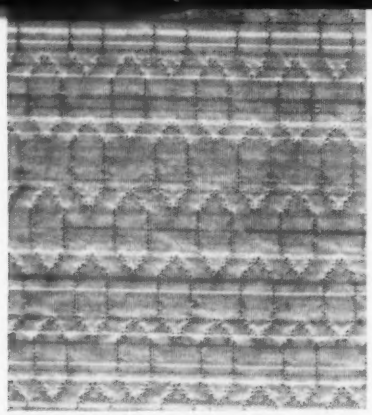
Russian research on polyvinyl alcohol fibers has shown that the polymer may be improved by increasing the molecular weight, lowering the number of residual acetate groups, and subjecting the fiber to deeper drawing after heat treatment. Insoluble, infusible polyvinyl alcohol fibers have also been made in Russia from vinyl alcohol/crotonamide and vinyl alcohol/methyl crotonamide copolymers.

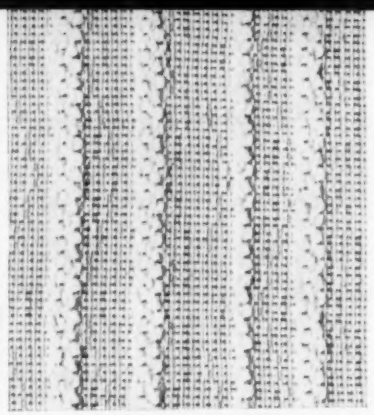
Under the heading of polyvinyls should be mentioned some Russian developments about which we so far know very little. First, the Russians claim that their Ftorlon fiber, a solution-spun polyvinylidene fluoride or fluorinated polyvinyl fluoride, is superior to Teflon in several ways (strength, chemical resistance) except heat resistance. The Russians also have a chlorinated PVC (cf. PeCe) mixed with nitrocellulose as a fiber called Vinitron. Another Russian fiber is Saniv, a 60% vinylidene chloride (saran) / 40% acrylonitrile copolymer. The textile world may hear more of these fibers in the future.

Postscript

This review of fiber developments in foreign countries is not claimed to be comprehensive and some selection has been exercised in the topics discussed. Some of the items deliberately (and not inadvertently) omitted, such as some West German modifications of acrylic fibers (dope dyeing), and British work on polypeptide fibers, may prove of great importance for the future.

Nevertheless, it is apparent from this cursory review that research and development by the textile industries of many countries has made and will make great contributions to textiles the world over.



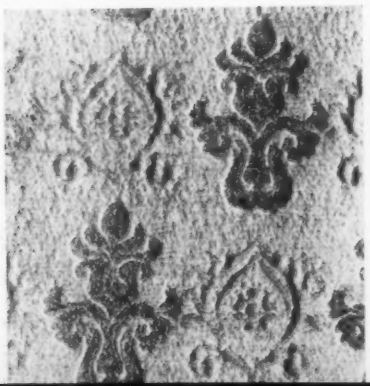


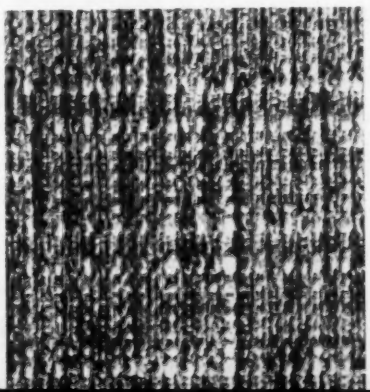
BLENDS: *Why stop at two fibers?*

by A. F. Tesi
Assistant to Director
Applications and
Product Development
Celanese Fibers Co.

Exclusive

FABRICS containing more than one fiber component constitute an important facet of the American textile picture. Indeed, while it is generally assumed that blends are something new, this is not the case. In a paper presented by R. G. Stoll before the National Academy of Sciences, National Research Council, it was noted that "mixing of different fibers was being done as far back as 2000 years." This paper quotes from the Book of Deuteronomy: "Thou shalt not wear garments of diverse sorts of any wool and linen





TOP LEFT: Matelasse combines nylon, Antron nylon, cotton, and rayon.

TOP RIGHT: "Drapel" drapery fabric contains Verel modacrylic, Rovana saran, and solution dyed rayon.

CENTER: Casement fabric has a Rovana saran warp combined with a 70/30 Verel modacrylic/solution-dyed rayon filling. Its flame resistance meets institutional fire-resistance requirements.

BOTTOM LEFT: Taslan textured nylon, cotton, and spun rayon are combined in this Jacquard upholstery fabric.

BOTTOM RIGHT: Five-fiber blend combines Taslan textured nylon, regular nylon, cotton, rayon, and jute.

TABLE 1. Fiber Properties in Relation to Fiber-Fabric Performance

Property*	Wool	Cotton	Rayon	Acetate	Triacetate	Nylon	Acrylic	Polyester
Tenacity, gpd	0.75-1.6	3-4.9	1.5-5.0	1.3-1.5	1.2-1.4	4.1	2.0-3.5	3.6-7.6
Elongation, %	25-35	3-7	9-30	23-34	25-40	13-45	25-46	13-48
Elastic recovery, %	63 @ 20	74 @ 2	30-74 @ 4	94 @ 2	88 @ 3	100 @ 8	92-99 @ 2	97 @ 2
Avg stiffness, gpd	3.9	57	11-29	5.5	4.8-5.0	11	5.5-10.6	7-58
Specific gravity	1.32	1.54	1.46-1.52	1.32	1.3	1.14	1.17-1.19	1.38
Resilience	Excellent	Poor	Poor	Fair	Fair-Good	Good	Fair	Excellent
Moisture regain, %	16	7	11-13	6	3.2	4.5	1.2-2.5	0.4
Moth resistance	Poor	Complete	Complete	Complete	Complete	Complete	Complete	Complete
Mildew resistance	Poor	Poor	Poor	Good	Excellent	Complete	Complete	Complete
Static	Good	Good	Good	Fair	Fair-Poor	Poor	Poor	Poor
Dyeability	Good	Good	Good	Good	Good	Good	Medium	Fair
Wrinkle resistance	Good	Poor	Poor	Fair	Fair-Good	Fair	Fair	Good
Crease retention	Good	Poor	Poor	Fair	Good	Good	Good	Excellent
Dimensional stability	Fair	Fair	Fair	Fair	Good	Excellent	Excellent	Excellent
Abrasion resistance	Fair	Good	Fair	Fair	Fair	Excellent	Good	Excellent
Remarks	Tendency to shrink if not finished correctly	——	Harsh hand, lack of crease retention	Tendency to glaze	Exceptionally high glazing resistance when heat treated	Tendency to form pills	Tendency to fuzz	Tendency to form pills

*All tests at 70 F, 65% RH

together." The Third Book of Moses contains the admonition: "Nor shall there come upon you a garment of cloth made of two kinds of stuff."

Rayon-Acetate Came First. While a limited number of different types of the same fiber have been used for centuries, the volume use of blends of different fibers has taken place within the past twenty years. The first commercially important man-made fiber blends were those from acetate and rayon, because these products of chemistry served as new tools for the textile designer and engineer. These two fibers permitted the creation of unique fabrics at low cost.

Of particular value was the interesting behavior of rayon and acetate toward dyes. Each fiber was colored with different classes of dyes which made possible diverse color styling principles. Many new fabrics were produced by the use of reserve, union, cross, and tone-on-tone dyeing.

It should also be noted that acetate was the only man-made fiber available that gave some degree of wrinkle performance. Indeed, it was the forerunner of the hydrophobic synthetics. Acetate was superior to rayon in this respect, and was therefore used, blended with rayon, to contribute ease of care properties. The later introduction of the more hydrophobic polyesters, acrylics, and nylons accelerated the trend toward blends and gave fabrics with greater ease-of-care and even wash-and-wear performance.

Blending has become so common and necessary in the past ten years that it is difficult to find 100% spun yarn woven fabrics made from large-volume staple fibers such as acetates, acrylics, polyesters, and nylons. This is illustrated by the fact that Test Fabrics, Inc. — who supply 100% spun fabrics for test methods use — has to have these fabrics specially made up because commercial fabrics of 100% spun yarns of the above fibers are virtually not available. Even though few 100% all-spun fabrics exist, it is estimated that close to 200 million pounds of these man-made fibers

are consumed annually in the U.S.

Why Blend? Having established that blending is important, let us see why blending is taking place and the type and number of fibers which are mixed in one fabric or yarn. Most of the reasons for blending may be summarized as follows:

1. To produce a yarn or fabric with properties not attainable from any one fiber — be it natural or man-made.
2. To facilitate the spinning and weaving operations.
3. To give multicolor dyeing effects.
4. To cut costs.
5. To alter the fabric hand and appearance.
6. To introduce or improve such performance characteristics as recovery from wrinkling, maintenance of permanent creases, abrasion resistance, higher strength, and dimensional stability.

In considering blends it should be noted that, at least from the mill operator point of view, some disadvantages do occur, among which are contamination, the cost of establishing suitable handling procedures so that intimate and uniform blending can be accomplished, and the difficulty of obtaining union dyeing when two or more fibers which dye with different classes of dyes are in the same fabric. These and other factors, such as maintaining inventories of a number of fibers, cost money and tend to discourage the use of blends. Nevertheless, the growth of blends attests to the fact that the advantages far outweigh the disadvantages.

TABLE 2. Dye Affinity of Fibers

	Disperse	Direct	Vat	Acid	Basic	Naphthol
Acetate	1	2	2	2	4	1
Triacetate	1	2	2	2	4	1
Cotton	2	1	1	2	2	1
Rayon	2	1	1	2	2	1
Wool	4	3	4	1	1	2
Silk	4	3	2	1	1	2
Nylon	1	3	2	1	1	1
Polyester	1	2	2	2	2	2
Orlon	1	2	2	2	1	2

1—Will dye
2—Will not dye
3—Will dye with selected colors
4—Stains

As indicated above, the advent of the newer man-made fibers accelerated the use of blends. This was true because the fiber engineer could select those fibers which contributed the needed properties and still produced an economical fabric.

Table 1 lists a number of the major fibers and gives a guide to fiber properties and fiber-fabric performance. This information can be used in selecting those blends which may give the type of performance needed, consistent with cost. *Tables 2* and *3* give the behavior of a number of fibers with regard to different classes of dyes. This information can be used to obtain color styling, using the principles of cross, reserve, union, and tone-on-tone dyeing.

It should be emphasized that the information given in these tables can serve only as a preliminary guide. Blending is a complex operation and adequate answers with regard to fabric performance can be obtained only by evaluation of a large number of specific finished fabrics.

The question regarding the number of fibers used in one fabric can be answered by looking at the commercial fabrics produced. As a result of much trial and error over the years, it is evident that two-fiber blends are by far the most practical and consequently the most widely used. Nevertheless, three-fiber blends and combinations do have a place in the American textile picture, and it is the objective of this article to indicate where and why three-fiber blends have been used, to list various fabrics containing three-fiber blends, and to show how certain fibers contribute toward specific performance characteristics.

While considerable interest is being evinced in three-fiber blends and/or combinations, it cannot now be predicted whether three or more fiber blends will be the

TABLE 3. Potentialities for Union, Reserve, and Cross Dyeing

	Acetate	Triacetate	Cotton	Rayon	Wool	Silk	Nylon	Dacron	Orlon
Acetate	—	U,C	U,R,C	U,R,C	U,R,C	U,R,C	U,R	U	U,R,C
Triacetate	U,C	—	U,R,C	U,R,C	U,R,C	U,R,C	U,R	U	U,R,C
Cotton	U,R,C	U,R,C	—	U	U,R,C	U,R,C	U,R,C	U,R,C	U,R,C
Rayon	U,R,C	U,R,C	U	—	U,R,C	U,R,C	U,R,C	U,R,C	U,R,C
Wool	U,R,C	U,R,C	U,R,C	U,R,C	—	U	U	U,R,C	U,R,C
Silk	U,R,C	U,R,C	U,R,C	U,R,C	U	—	U	U,R,C	U,R,C
Nylon	U,R	U,R	U,R,C	U,R,C	U	U	—	U,R,C	U,R,C
Polyester	U	U	U,R,C	U,R,C	U,R,C	U,R,C	U,R,C	—	U,R,C
Orlon	U,R,C	U,R,C	U,R,C	U,R,C	U,R,C	U	U,R,C	U,R,C	—

U—Union
R—Reserve
C—Cross dye; two different hues but can be related shades

coming thing.

What Is a "Blend"? Before proceeding, it becomes necessary to define the term "blend," so that the scope of this presentation can be better understood. Strictly speaking, the term blend applies only to a fabric or yarn made of intimate mixtures of two or more different fibers. A fabric with the filling yarn composed of one fiber and the warp of another is not a blended fabric. When two yarns—each made of different fibers—are placed alongside each other or even plied, this arrangement is usually referred to as a combination or ortho mixture.

For our purposes, no limited meaning will be applied to the term blend. Any fabric that contains three or more fibers—whether intimately blended into one or more yarns, or whether a combination of intimate blends in one direction and 100% one fiber in the other—will be considered.

It has often been asked what can be gained by using so many fibers in one fabric. From a basic fabric engineering point of view, it would appear that the use of three fibers instead of two would broaden the scope of fabric performance. A search of the literature reveals that J. F. Sayre ("A Study of Three Fiber Blends," *Modern Textiles*, July 1954, p. 31 and p. 573, *Man-Made Textile Encyclopedia*) studied three-fiber blends of Dacron, rayon, Orlon, and acetate. The performance characteristics investigated were crease recovery, liveliness, bulk, static propensity, abrasion resistance, tear and tensile strength, hole melting, flammability, and pilling.

This work and other research sources on the contribution of specific fibers in blends has revealed some general conclusions. For example, (as indicated in *Table 1*) nylon is noted for abrasion resistance; polyester for abrasion resistance and wrinkle performance; acrylics for bulk; rayon, cotton, and acetate for comfort; while all of the hydrophobic fibers, including triacetate, are noted for their contribution of dimensional stability.

With regard to the studies of Mr. Sayre, in general it was concluded that the addition of a third component is no guarantee of a fabric with enhanced over-all characteristics. It was further noted that many of the three-component blends investigated appeared to offer little of practical interest, except in the illumination cast on the fiber properties in the blend. It was also stated that, in general, three-component blends exhibited characteristics which might reasonably be predicted from a knowledge of the performance of two-component blends.

While the foregoing is a somewhat pessimistic picture for three-or-more-fiber blends, and undoubtedly accounts for the overwhelming predominance of two-fiber blends, it should be noted that the work of Sayre was confined strictly to the performance aspects. From a marketing point of view, the value of styling, aesthetics, and attainment of specific performance properties at low cost cannot be overemphasized. It is in these areas that three-fiber blends have made and will continue to make their most important contribution.

Let us see what has been done, what fabrics have been publicized, and where possible indicate why certain fibers have been used. The following data were obtained by reviewing the technical and trade literature, including trade newspapers.

Woven Fabrics. The skillful use of a third (thermoplastic) fiber to impart press/crease retention and wrinkle performance at reasonable cost can be found in the fabrics of Bondyne Associates, Inc., and Veriset Association, Inc. Among the Bondyne fabrics are:

1. An 82% rayon/12% Dynel-/6% acetate twill.

2. A fabric composed of warp containing 85% rayon/15% nylon, using a filling of 70/30 rayon-/Dynel (approximate composition 78/15/7 rayon/Dynel/nylon).

3. A 50/25/25 rayon/acetate/-Dynel, and

4. A 65/25/10 rayon/Dynel/-wool

Among the Veriset fabrics are a 74/18/8 Corval rayon/Dynel/wool and a fabric similar to No. 2 above but using a 70/30 rayon/Verel filling yarn. It is clear that in at least some of these fabrics the nylon was used to impart abrasion resistance, the modacrylic for press/crease retention, and the rayon for economics.

Another example of successful fabric engineering using three fiber blends can be found in the popular batiste fabrics made from a nylon filament warp and a 65/35 polyester/cotton filling. Approximate composition of this fabric is 31 nylon/44 Dacron/25 cotton. It might be presumed that nylon contributes strength with light weight, Dacron general wrinkle performance, and cotton antistatic properties.

A third approach which is interesting, since it exemplifies a color styling principle, is a fabric composed of 65/35 Dacron/rayon. In this case, both Types 64 and 54 Dacrons are used with the result that color styling effects are possible since each type can be dyed with different classes of dyes.

Other examples of the use of three fibers to demonstrate the color styling principle are a 50/45-/5 Dacron, worsted, Coloray blend suiting fabric, the Coloray providing piece dyed decoration; and an 80/15/5 Corval, wool, acetate slack fabric where the acetate adds multi-color dyeing effects.

A popular blend of 50/25/25 Orlon, Corval, and Arnel, used for men's slacks, depends on the high percentage of acrylic fiber to impart stability, the Arnel for crease retention, and the Corval for hand and economy.

Additional examples of three-fiber blended fabrics suitable for general wearing apparel are:

1. 40/40/20 acetate/rayon/nylon
2. 55/35/10 Acrilan acrylic/rayon/acetate
3. 55/26/19 cotton/rayon/Arnel
4. 45/38/17 cotton/Orlon/420 nylon
5. 34/33/33 nylon/acrylic/rayon (stretch nylon warp)
6. 65/25/10 Dacron/rayon/mohair
7. 50/25/25 Dacron/nylon/rayon
8. 50/42/8 Dacron/wool/rayon
9. 70/15/15 rayon/acrylic/acetate
10. 59/45/6 rayon/acetate/nylon
11. 70/15/15 rayon/acetate/nylon

Continued on page 100

How a fiber producer's marketing plan charts road to textile sales

Launching a new fiber

Exclusive

ONE DAY next week before the doors at Bamberger's, Newark, swing open to the shopping crowds, a group of sales clerks from the store's women's ready-to-wear department will gather for a meeting. The ladies will see a movie on Creslan acrylic fiber, narrated by Betty Furness, and a representative of American Cyanamid Co. will discuss selling points and hang tags, and distribute sales literature.

This activity will be repeated in a variety of major department stores throughout the country as retailers gird themselves for the back-to-school shoppers.

Recently a unique fashion show was staged in New York, Los Angeles, and Portland for garment buyers and the trade press. In place of the usual procession of production samples, the models wore a collection of experimental garments testing new styling ideas for men's and women's apparel, using Creslan.

Neither the retail store nor the garment buyers were direct customers for Cyanamid, producers of Creslan acrylic fiber.

The two incidents are significant, for they point up the lengths to which man-made-fiber producers must go in marketing their products.

Trade Criticism. Of late there has been much grumbling in the textile trades about the merchandising activities of man-made-fiber producers. This dissatisfaction was noted in a trade paper recently which said:

"Progress of man-made fibers in various end markets is being slowed by a combination of mistakes. These mistakes include:

"Putting new fibers into consumer products that have no new style appeal.

"Using new fibers as a replacement for other fibers for the sole purpose of price competition.

"Putting fibers on the market in products for which they were not intended.

"Confusion on the performance claims for fibers."

This item painfully points out that marketing is the key problem in the acceptance of man-made fibers today. Styling, price, quality control, and end-use per-

formance are but a few of the difficulties involved in the marketing of man-made fibers.

That marketing should be the key sore spot in the acceptance of new fibers is understandable in terms of the complex levels of textile distribution serving a market already crowded by a plethora of man-made and natural fibers.

Complex distribution channels and competition does not excuse the criticism, but it is no simple matter to wed man-made fibers, the bright child of the chemical industry, to the habits of the mature and often fickle textile trades. Too often those who are first to criticize that man-made fiber producers are not doing enough are last to do anything at all. More often one fails to see how complex are the levels of distribution. In order to see more clearly the problem of marketing man-made fibers, let us do a little role playing.

Imagine yourself the key manager of a chemical company which has developed a new fiber. The fiber has passed the tests of research and development, pilot plant production, and has been found suitable for a wide range of apparel and home furnishings end uses.

A decision has been made to go commercial and a plant is being built. Furthermore, you are informed the fiber can be run on existing spinning and weaving systems; it has particularly good dyeability with a wide variety of dye classes. It can be blended with other fibers, and offers economic and performance advantages when compared to other fibers.

In short, it has a whole series of plus factors which lend themselves to successful textile use.

Questions Raised. Now the question: How would you go about presenting the fiber to the textile industry? Remember, it does not have a name known to the trade or consumers. It is a complete unknown to commercial spinners, weavers, dyers, cutters, and the buying public.

How do you introduce it to the trade? What steps would you take to insure quality? What should the price be? What segments of the market will you go after? What type of organization will you develop to do the job? What steps will you take to convince top management the expenditure on advertising and promotion will be worthwhile? What kind of market intelligence will you develop to make sure your judgments are reliable?

You may answer — advertise, promote, stress quality, and provide technical service. But this understates the problem. How do you advertise? To whom? How much? Where? What do you say? The consumer is not so naive as to believe in "miracle" fibers. What kind of quality control? To what level? Mill? Manufacturer? What type of price policy? What type of promotion policy? What kind of technical service and how much? What should be the role of advertising? Promotion? Public Relations? And, if you are not discouraged yet, how do you obtain qualified personnel? How do you maintain the support of top management to accept the necessary long-run approach, while hungry to see enterprise become profit-maker in shortest possible time?

These questions are more than academic. They are the day-to-day problems faced by all fiber producers from the time the fiber goes commercial.

Getting the fiber child to learn the ways of the textile family of mills, manufacturers, and retailers is not easy. Fiber producers are faced by a paradox. Although they do not spin a single yarn, weave a yard of cloth, dye a bale, cut a pattern, or sell a garment made of the fiber, they must behave as if they do and be knowledgeable about all the problems in the distribution chain.

As can be seen, a fiber producer must have a strong staff of competent technical and merchandising personnel to deal with the multitude of questions raised as the fiber moves through the distribution chain from mill to consumer.

Needed: A Marketing Plan. But organization to serve mill, manufacturer, and retailer is only part of the program to win markets for a new fiber. There must also be A Plan.

How important is the plan? The two-decade history of the man-made fiber business includes examples of efforts which did not prove successful.* In many cases these efforts failed not because of poor fiber performance, but because they did not anticipate the changing needs of the textile industry. In short, they were not designed to help the textile trades do a better selling job. A study of marketing man-made fibers makes the lesson clear: A man-made-fiber producer must have both the organization and the plan to do the merchandising job.

The Creslan organization is structured to relate all activities to marketing. The purpose is to stimulate fabric use and development and give technical support. It is postulated in "the concept that executives at various distribution levels are interested not alone in buying fiber, but in selling merchandise. Such top managements are concerned solely with the profits of their organization. Their profits are established through economic use of fibers which represent proper marketing catalysts for making textile merchandise."

"Wedge" Marketing. Wedge marketing is a cooperative effort among all areas of sales and merchandising to develop comprehensive programs which will interest mills in the broad use of Creslan. Here's how it works:

A target mill is selected. Each member of the marketing team researches his area to find out everything pertinent to the problem. Each member of the team reports to the project group the highlights of what he has found.

For example: *Market research* reports on the mill's yardage breakdown in terms of fiber blends, dollar volume, etc.

Sales reports on the types of styling and construction handled by mill divisions. Sales also reports on the types of machinery, new acquisitions, etc., which have a bearing on future plans as well

*Remember Aralac, Caslan, Conomet, Cupranium, Soylon, Vicara . . . . . — Editors.

as current operations.

Merchandise managers report on the fashion influence of the mill, the mill's customers, and how customers stand in their respective markets.

Quality control reports on standards and performance in the areas cited and examines the field for new levels of quality. The manager of designer services reports on designer influence exerted by the mill and the types of styles important to the mill.

The aim of the whole program is to have the mill use Creslan in broad lines of merchandise, not in just one fabric for one garment. Advertising and promotion efforts are designed to present Creslan within the broad picture.

Six or so major manufacturers of various types of garments are considered to be linked together by a common theme. The strategy is to sell a creative packaged idea, not just a fiber. The merchandise department assigns a representative on a permanent basis to report and articulate this program as well as all related programs in the fabric market to these same sales and merchandising executives at the mill sales office.

Advertising and promotion managers work out a theme and the details of the promotion. The retail merchandising manager is brought in on the developments to suggest timing with seasonal retail activities. The whole program is then presented to top mill management.

The impact of wedge marketing is threefold:

(1) The plan is to make the mill think of Creslan not as a fiber for one specific fabric, but as a source for broad end uses. The aim is to enlist top management behind the technical effort.

(2) The strategy is to encourage cutters to buy fabrics made with Creslan not for a single style in the line, but for a collection that would be merchandised as part of a dynamic store promotion idea.

(3) The idea is carried to the store buyer as a packaged idea to buy not just a Creslan item here and there in the market, but a completely wrapped up promotion that covers several manufacturers.

Shows displaying new fashions with Creslan are part of continuing promotion for the fiber.

The idea is further carried to the trade and public by building a fashion story around it and presenting it to the press. Wedge marketing is designed to create an image all the way down the distribution line from the mill to the millions.

Merchandising Support. The responsibility for developing marketing approaches rests with the various merchandising areas. Men's wear merchandising is concerned with the development of marketing programs in which mills and cutters can participate. Merchandising representatives call continually on prominent cutters throughout the country to step up their interest in and specification for Creslan fabrics.

In the women's wear area the approach is similar, but emphasizes fashion, which is all-important here. Insight into trends, seasonal distributive requirements, and the susceptibility of the American woman to new ideas provide the raw material for this department's daily activities.

Sales Support. In these efforts, the sales department has an important role. It works closely with offices of mills and converters to further encourage and coordinate fabric development and sales. It has the responsibility for servicing yarn and fabric mills with fiber requirements and related technical service.

Influential marketing segments must be stimulated by merchandising, educated by merchandising and sales, and serviced and sold by sales to give authenticity and reinforcement to the marketing efforts.

Quality Emphasis. Since its introduction, there has been a continuing campaign in both trade and consumer press designed to create brand recognition and the association of quality with the Creslan trademark.

The role of quality control is to make sure that wherever Creslan is used there will be an outstanding level of performance. To do this the quality control unit serves as a clearing house for data on apparel performance and carries out an extensive program of fabric testing. It is the keystone of the program.

Cyanamid sells and ships an acrylic fiber. The Creslan name is given out only after each fabric passes exacting requirements. The work of quality control is designed to assist mills and manufacturers protect their reputation and investments by insuring highest performance.

Quality control is part of a group of services to mills and manufacturers. But the retail level must also be served by the fiber producer. Cyanamid does this through "Channel C."

Retailer Support. Channel C is a communications service unique in the textile industry. It was de-

signed by Cyanamid to service fiber customers at every phase of marketing. It is an organization for the exchange of information to everyone concerned, from plant to retailer.

Channel C maintains a staff of 50 retail-trained representatives providing personal contact with 250 of the nation's leading stores. Each of the representatives is a resident of a local market and is ready to hand-tailor a national program to the needs of the local area, bringing all available information to buyers, merchandise managers, and advertising staffs.

Channel C bridges the gap between current retail performance and other stages of textile activity.

Technical Support. Any discussion of the problems faced in marketing a man-made fiber would be incomplete without mention of the role of technical service. In planning a new marketing venture, field technical service assesses the fiber property requirements, such as abrasion resistance, flex life, resilience, and strength needed for satisfactory end use. They also assess the state of the textile processing arts from opening and picking to dyeing and finishing to see whether developed techniques are adequate for covering fibers in the intended end-use products.

In general terms, technical people help move Creslan by determining fiber properties and textile techniques needed to broaden markets by bringing about improvement in fiber properties and by helping customers use the fiber in their mills and dye houses.

One interesting example of this is the blanket area. A study of production practices revealed that many blanket mills utilize different spinning systems for preparing warp and filling yarns. An effective contribution to minimize inventory requirements resulted in the development of a versatile product, designed specifically for blanket use and capable of being processed on the systems common to blanket manufacture.

The innovation has proved a production and commercial success.

Mistakes in the marketing of man-made fibers can be costly in terms of profits and prestige. Cyanamid has attempted to develop a marketing program for Creslan acrylic fiber which will avoid the errors of styling, price, quality, and performance cited in the opening remarks.

As is apparent, the marketing of a man-made fiber is both complex and expensive. The distribution pattern in the textile industry has compelled man-made-fiber producers to be much more than suppliers of raw materials. It has brought about the need for leadership and a custodial role of being a gadfly to the trade to insure performance and reputation.

Printing glass

(from page 86)

and packaged for shipment.

The bulk of Lisbon's output of glass printed fabrics goes to well known mail order houses, while a small portion is sold through its converter-customers to interior decorators. While glass printing is today the specialty at Lisbon, Ray Andersen, Sr., and his son, have already taken several steps to broaden the plant's operations.

Recently, a modern flash aging unit for the application of vats has been installed, which is arranged for continuous operation with an open soaping and drying range. Incidentally, the company's experience in this printing method goes back many years; Ray Andersen, Sr., operated such a range at the time of its introduction to this country. It is especially suitable for the screen printing operation, as is well known, since the prints can lie indefinitely before aging.

Lisbon also has facilities for dyeing on the jig, and for finishing cottons, rayons, and acetates, just to mention three popular fabrics in the drapery markets. As yet, the company has not invested in automatic screen printing equipment, but is ready to do so when the need becomes evident. In addition to normal screen printing operations, Lisbon does a sampling service for roller printers and has facilities for making screens rapidly in an emergency.

Multifiber blends

(from page 96)

12. 50/40/10 Zantrel rayon/Corval rayon/wool
13. 40/40/20 rayon/wool/nylon
14. 70/20/10 wool/rayon/nylon
15. 60/30/10 wool/cashmere/nylon

Another example of activity in three-fiber blends is shown by the fact that a number of mills are working with blends of Fortrel /polyester/Arnel/cotton, Fortrel/ Arnel/Corval, Fortrel/rayon/Avlin, Fortrel/wool/mohair, and Fortrel/Topel/mohair in such fabrics as batistes, broadcloths, crepes, flannels, gabardines, linens, and tropicals. As these trials progress, it will be clearer just what direction these types of three-fiber blends will take.

Knit Fabrics. A number of knitted fabrics containing more than two fibers have been mentioned in the trade press, among which are:

1. 65/27/8 Arnel/cotton/nylon seersucker (for laminating)
2. 50/36/14 Arnel/cotton/nylon novelty knit (for laminating)
3. 70/20/10 wool/fur/nylon for women's sweaters
4. 70/20/10 wool/angora/mohair for women's sweaters
5. 50/30/20 acrylic/Coloray/420 nylon for men's hose

The last blend relies on the acrylic fiber for dimensional stability and bulk, the Coloray for color effects and the nylon for strength and abrasion resistance.

Drapery Fabric. Another ingenious use of three-fiber components is illustrated by a drapery

fabric which has sufficient flame resistance to meet institutional fire-resistance requirements. This fabric is composed of a Rovana saran warp yarn with a 70/30 Veral/rayon filling.

Development Fabrics. The fabrics listed above have passed the development stage and are either volume commercial fabrics or have been sampled in the trade. Development work involving three-fiber-component fabrics is also going on, and while much of the work is not yet available, some insight as to the thinking along this line may be gathered by a few examples.

Work done at Celanese and published in *Modern Textiles,* October 1958, page 40, shows that wash-and-wear fabrics can be produced from three-fiber blends of polyester, Arnel triacetate, and rayon. Three fabrics shown in *Table 4* are examples of what can be done with these three-fiber blends to give fabrics which:

a) retain pressed-in creases on laundering,

b) require little or no ironing after machine washing,

c) resist wrinkling during wear, and

d) maintain a serviceable appearance in normal use.

Development work in knitted fabrics utilizing Arnel 60, cotton, and high-bulk Orlon 42 has resulted in a T-shirt fabric which shows promise. A 30/1 (17.8z) yarn made of 50% 1.5 dpf, 1½" Arnel 60; 35% 1¼" CP cotton; and 15% 2.0 dpf, 1½" Orlon 42 (hi-bulk); with the following characteristics

Tenacity, gpd	1.23
Elongation, %	5.8
Gr break, avg	214
Gr break factor	6508
Skein break, avg	63.9
Skein break factor	1943
C V, %	16.3
Skein shrinkage, %	13.8

was knit into a fine 28-cut jersey fabric for T-shirts. The advantages attributed to this three-fiber blend, which were revealed on wear tests, were dimensional stability, quick drying, and good wrinkle performance. Yarns employing this principle of using triacetate with high-bulk acrylics plus cotton should be suitable for producing knitted products for underwear, sleepwear, and outerwear.

TABLE 4. Wash-and-Wear Construction Containing Arnel Triacetate, Cellulosic, and Polyester Fibers

	Gabardine	Sheen Gabardine	Suiting
Warp yarn			
Count	14/1	15/1	28/2
Tpi	16.8 S	18 S	15 Z x 17 S
Arnel, 2.5 dpf, 2"			
Type	Brt	Brt	Dull
Per cent	50	50	65
Brt rayon, 3 dpf, 2"			
Per cent	30	30	20
S-d Dacron, 3 dpf, 2"			
Per cent	20	20	15
Filling yarn	Same as warp	Same as warp	Same as warp
Weave	2/1 twill	5-harness satin	2/2 herringbone
Reed	45/2	50/2	20/3
Reed width, in.	52.0	53.5	53.0
Pick wheel	50	58	52
Grey width, in.	51.0	51.0	50.0
Finished width, in.	47.0	47.0	46.0
Finished thread count	99 x 60	115 x 66	71 x 57
Finished weight, oz/sq yd	9.2	9.1	5.6

Hartford Fibres Co. reveals a development carded-yarn fabric using 40% Zantrel, 40% cotton, and 20% 420 nylon. It is claimed that the Zantrel upgrades the blend to give a fabric with a combed-yarn appearance. The nylon as always is added to improve the abrasion resistance and tear strength.

Chemstrand has in development a fabric containing Acrilan 16, regular Acrilan, and wool. Although this is not a three-fiber blend according to the Textile Fiber Products Identification Act, it is a good example of color styling by use of regular and modified fibers of the same generic class. The yarns used have a 5½-run (12 S) warp and filling. The warp is 35% 3 dpf, 2½" sd Acrilan 16; 35% 5 dpf, 2" sd Acrilan 16; and 30% 8-month Texas wool. The filling is 35% 3 dpf, 2½" sd regular Acrilan; 35% 5 dpf, 2" sd Acrilan 16; and 30% 8-month Texas wool.

The different dyeing characteristics of two types of Acrilan provide novel color effects, while retaining a basic blend of a high percentage of Acrilan with the wool. The recently introduced Orlon Type 44 may be used to give similar effects in blends with regular Orlon Type 42.

Eastman Chemical Products, Inc., has developed a tropical (4.5 oz/sq yd) composed of 50% 1½ dpf, 1½" sd Kodel; 25% 64s wool; and 25% 1½ dpf, 1½" Avron.

Summary. The information presented here has shown that two-fiber blends are by far the most important. Nevertheless, fabrics containing more than two fibers do offer many intriguing possibilities. The dozens of three-fiber blends illustrated can well be the forerunners of hundreds of such fabrics, once the resistance to three or more fiber blends has been reduced. A study of the arguments used against three-fiber blends shows that they are the same ones employed when the 100% one-fiber advocates reigned supreme.

The 100% phobia has been exorcized, at least as far as two-fiber blends are concerned. Now it remains to be seen whether the embryonic activity in three-fiber blends will be aborted by over-concentration on the negative aspects.

A look at the record *(from page 80)*

and other properties to capture a large share of the market then dominated by cotton. With increasing competition from nylon, the demand continued for even greater yarn strength and improved fatigue resistance. As a result came the introduction of various "super" grades of rayon tire yarns during the past few years, another demonstration of what research has done for this one end-use.

When rayon crepe dress goods were in their growth era, significant advances were recorded in the development of rayon yarns with engineered stress-strain properties to permit the weaving of almost any desired type of crepe fabric uniformly and with the greatest efficiency. A number of years ago, "thick and thin" or slub type viscose yarns added to the variety of products affording greater styling versatility, while in recent years the sole domestic manufacturer of cuprammonium rayon created an assortment of nubby and slubby yarns, some of the most popular ones bearing a close resemblance to naturally uneven raw silk.

In 1959, one producer introduced a new rayon yarn with a latent crimp which is activated when the fabric containing it is subjected to normal wet processing operations. The crimpable yarn is particularly suitable for upholstery, tufted bedspreads, and scatter rugs, providing a high degree of bulk and cover which, in the case of washable articles, is restored whenever they are wet out again. Another innovation by the same manufacturer is what is described as "multicellular" rayon staple which has unique self-bonding characteristics and contributes a firm, crisp hand to apparel and furnishing fabrics. It is also useful in paper making and for other industrial applications.

Rayon Staple. Paralleling the improvements made in continuous filament yarns, rayon staple has undergone a tremendous job of "face-lifting" since the 1920's. In addition to the somewhat similar problems of inadequate tenacity, dyeing uniformity, and limited degrees of luster, the industry went through its growing pains because of such difficulties as lack of uniformity in filament diameters, cut lengths, and "splinters" or coarse and adhering fibers. Then came improvements in crimp, and the development of coarse denier fiber for carpet yarns, while variations in cross-sections provided numerous novel effects, including lustrous, flat, straw-like yarns, a higher degree of bulk from "hollow" filaments with air voids incorporated, and increased resilience.

One of the great developments which has enjoyed remarkable growth in the market up to the present time is that of spun-dyed or solution-dyed rayon, in both filament and staple form. While the fabric stylist and mill man continue to frown upon the limitations imposed by use of precolored fibers, they have found these products extremely important in certain applications where essentially indestructible colorfastness is of major concern, particularly in curtain, drapery, upholstery, and washable apparel fabrics.

For the record, it should be noted that this development has not been as simple as it sounds, involving more than a decision to produce colored fibers and turning them out by the mere selection of the desired color of dyestuff or pigment and incorporation in the viscose or cuprammonium solution before extrusion. Most rayon producers have spent considerable sums of money and years of research to arrive at the proper pigment and technique of utilizing it to attain the desired shade which will resist fading or crocking under severe service conditions.

Perhaps the most exciting development in the field of rayon staple has been that of basic cellulose modifications to provide fibers with improved hand, as by cross linking, or dimensional stability and resistance to mercerization as demonstrated by the new high-modulus rayon staples. Some of the commercially available rayon fibers have a tenacity of over 5 grams per denier, and all possess the property of lending themselves to compressive shrinkage treatments in woven fabrics or reduced shrinkage in knit constructions without the use of chemical finishes. In those fabrics where it is desirable to have a high degree of dry and wet crease resistance by the use of various resin finishes, the high-modulus rayons have shown much less reduction in tensile and tear strength as well as abrasion resistance than commonly occurs in conventional rayon fabrics.

Acetate. Acetate staple and filament yarns have registered a number of technological gains since they were first marketed about 40 years ago, including higher tenacities and availability in a wide range of solution-dyed colors. For specific uses where high bulk and resilience are of importance to serve as filler in pillows, comforters, and as garment or sleeping bag insulators, many modifications have been made in staple fiber cross-section and crimp.

While basic resistance to hot ironing has not been achieved without special fabric finishing techniques, the advent of triacetate afforded a multitude of new attributes while retaining some of the aesthetic properties of conventional acetate. These newer acetates offer improved tenacities, temperature resistance, and color fastness, along with the ability to retain creases and pleats in washable apparel fabrics.

Nylon. Apart from its outstanding importance in military fabrics, nylon was undoubtedly the first man-made yarn which received universal acceptance with a minimum of criticism, probably because of the women's vote for its contribution to attractive, durable sheer hosiery and easy-care lingerie. The offering of nylon 6 at a later date provided a more dyeable type of nylon with claims also made for an improved hand.

In addition to rapid upgrading in tenacities, uniformity, and dyeability, two significant advances were recorded among the many achievements of the producers. Du Pont's Type 420 staple with altered

stress-strain characteristics to make it compatible with cotton in blends where its part in increasing strength and wear resistance is significant, made practical blends with up to 25%, with a gain rather than a reduction in fabric strength and tear resistance experienced with conventional nylon staple.

More recently, multifilament nylon yarns with multilobal filament cross-sections permit the weaving or knitting of fabrics with a dryer or warmer silk-like hand, overcoming earlier objections to the cold or clammy hand of standard nylon. In monofilament form, similar alterations of the filament cross-section gave greater style flexibility in enabling the creation of sparkle effects in women's hosiery and lingerie. Just a couple of months ago Du Pont introduced a sparkle type staple for scatter rugs.

Except for the air-jet bulking technique, many of the various texturizing processes which produced stretch and bulk textures, in some instances simulating the hand of spun yarns with greater yarn evenness and freedom from fuzzing and pilling, must be credited to the creative genius of individuals not directly associated with the yarn producers. Another exception is producer-textured continuous filament nylon yarn designed particularly for the carpet trade and currently enjoying exceptional popularity.

Increasing interest in the use of zero or minimum twist yarns as delivered by the yarn producer has resulted in the creation of special yarns in which there is what might be described as an inherent tangling of the filaments to bind them together to allow for easier processing by the mill.

A short time ago the Du Pont Co. announced plans to enter into limited production of a new nylon with a much higher temperature resistance, of special interest in industrial and military fabrics.

Polyesters. Polyester staple and filament yarns, by virtue of their truly remarkable contribution of superior wrinkle-resistance, along with high strength and hydrophobic properties which satisfy the growing demand for easy-care garments, curtains, and draperies, gained ready acceptance with a minimum of criticism. Notable improvements which have been made available during the few years that they have been on the market include types of staple with superior resistance to pilling and filament yarns altered in cross-section and chemical composition for a warmer, silk-like hand and better dyeability.

In spite of general satisfaction with the bulking characteristics which make some polyester staples suitable for pillows, comforters, upholstery, and as garment insulating materials, Du Pont only a few months ago announced a new type reputed to have even greater bulking power through alterations in the crimp structure.

Acrylics. The acrylics met with rapid popularity in knitted sweaters and jerseys, blankets and carpeting and show signs of making further gains in woven apparel fabrics by virtue of their bulk and cashmere-like or wool-like hand, retention of creases and pleats, and ease-of-care contributions. Fibrillation was a troublesome fault with some acrylics which was overcome through intensive research and development soon after the problem came to the attention of the producer.

In a matter of only two or three years we have witnessed the marketing of whiter and more dyeable fibers. One producer has achieved even greater progress with the introduction of a novel "reversible" crimp-type staple, especially suited for achieving lofty and wool-like hand in knitted wear without relying on the use of a blend of fibers with variable shrinkage.

Also offered are a smooth, "animal-like" fiber, simulating the hand of mohair, and an improved carpet staple which exhibits reduced flammability properties. The modacrylics, too, have moved forward in modifications for greater utility in soft floor coverings, high-pile fur-like fabrics, and in an increasing range of spun-dyed colors.

Natural Fibers. In the meantime, undoubtedly alerted and prodded by the increasing competition threatened by the old and new man-made fibers, noteworthy gains have been recorded by those engaged in cotton and wool research. From the standpoint of im-

"... rayon staple has undergone a tremendous job of 'face-lifting' since the 1920's."

"...nylon was undoubtedly the first man-made yarn which received universal acceptance with a minimum of criticism, probably because of the women's vote for its contribution to attractive, durable sheer hosiery and easy-care lingerie."

"...also offered is a smooth, 'animal-like' fiber, simulating the hand of mohair..."

1961 MAN-MADE FIBERS CHART →

TO REMOVE IT from the magazine, tear along the dotted line.

FOR A REPRINT, write to The Editors, "Textile Industries," 1760 Peachtree Rd., N. W., Atlanta 9, Georgia

provements in the fibers and yarns themselves, perhaps most significant have been the various chemical modifications to yield cotton products which show greater resistance to mildew and bacteria, certain chemicals and high temperatures. Constant gains have been made, too, in breeding types of cottons which are more desirable as well as in the recognition of certain practices in ginning which have been detrimental to cotton quality.

In the case of wool, there have been relatively few modifications of the basic fiber. It is to be noted that such treatments as the large number of cotton crease resistant and "wash-wear" finishes announced in recent years and the techniques for endowing wool fabrics with moth resistance, felt and shrink-resistance, easy-care characteristics, and superior abrasion resistance are outside the realm of fiber modification and improvements with which this discussion is concerned. As in the case of wash-wear cottons, such accomplishments relate to fabric finishing methods.

Yet To Come. What are some of the improved characteristics which might be desirable in the man-made fibers as they exist today and what properties might enhance their worth and broaden their markets? In spite of the fact that certain of the crimped rayon staples have a pleasant hand and afford a certain amount of loft and bulk, still further improvements along these lines would be welcome. Warmth to the touch, greater resilience, reduced moisture absorption, and alterations to permit more rapid drying of all-rayon fabrics could be of interest for many end-uses.

Built-in resistance to burning would be an asset for use in drapery fabrics and in knitted fleece-like apparel as well as for chenille spreads or rugs with high piles of low density. In coarse denier carpet fibers, resistance to soiling, ease of spot cleaning or soil removal, more rapid and complete recovery from pile deformation, and increased wear resistance are improvements which would make rayon more attractive for use in carpeting.

Although many people feel that rayon can never be a serious competitor to cotton, others hold the opinion that a rayon, still available at its present low price level, with a true cotton-like hand would open tremendous markets for this cellulosic man-made fiber.

Ordinary acetate with higher tenacity might be valuable in encouraging use of finer deniers. Greater resistance to hot ironing and dyeability without the need for resorting to selected colors or the use of inhibitors to reduce gas fading would certainly be attributes to make such fibers and yarns more useful.

In nylon, staple which does not pill, staple and yarns which do not produce dangerous hot melt drippings when ignited, freedom from static electricity charges, resistance to discoloration, improved ease of soil removal, and greater recovery from wrinkling are some of the needs which most consumers would welcome. Also, for use in curtain and draperies, freedom from concern about strength degradation from sunlight exposure would give nylon a chance to regain another market.

The problem of hole melting, pilling, static, and soil resistance or ease of soil removal are some of the objectionable features of most of the polyesters as well as the nylons. Other goals worth striving for in the polyesters are easier dyeability with good fastness at a moderate cost.

Continuous filament acrylic or modacrylic yarns have been talked about for years, with the thought that they might be more closely related to real silk in hand, but with superior durability. Limited amounts of such yarns have already reached the sampling stage. Since the withdrawal of the original Type 81 filament Orlon acrylic yarn from the market years ago, many users of industrial fabrics with specific requirements for chemical and heat resistance have indicated their desire to have a suitable replacement.

The relatively new spandex and olefin fibers and yarns have not been in production long enough to arouse general recognition of their shortcomings. It is recognized, nevertheless, that commercial dyeability with good color fastness in a complete range of shades is yet to be achieved in the case of the polypropylenes, and an increase in resistance to normal hot ironing temperatures would certainly be no drawback. Some of the spandex yarns are still lacking in ability to remain white after exposure to chlorine bleaching.

Cotton fibers with inherent luster, resilience, and loft, through imparted crimp or other modifications, are not outside the realm of possibility. Acceptance of dyes with the ease and brilliance of its cellulosic man-made competitors is another feature which would help cotton retain its outstanding leadership in quantity of all fibers consumed in this country. Yarns with durable stretch properties to emulate the popular elastic nylon and polyester yarns would undoubtedly afford even greater markets for cotton.

Continuing investigations of the possible changes to be achieved through the irradiation of natural fibers may some day result in outstanding accomplishments. Unfortunately, it would appear that at the moment basic changes in the natural fibers themselves prior to conversion into yarns or fabrics do not appear to be too promising, both from the standpoint of economy and taking into consideration the possible effects on processability by methods and machines which have taken centuries to develop.

In summary, the record of achievements in the field of all fibers is one of which the industry may well be proud. In the meantime, scientists continue to try to make the chemical fibers equal or superior in every respect to cotton, linen, silk, and wool, while the proponents of the natural fibers strive equally as hard to match some of the properties of their manufactured competitors. But all agree that there will never be a single all-purpose fiber to suit the diversified needs of the textile industry.

AUGUST
1961

		Acrylic	Modacrylic	Polyester	Regular, Medium, High Tenacity
Specific gravity		1.17-1.19	1.30-1.37	1.38	1.46-1.52
Tenacity, grams/denier	Dry (70 F, 65% RH)	2.0-3.5	2.5-3.0	3.6-7.6	1.5-5.0
	Wet, % of dry	80-100	100	100	44-72
Tensile strength, 1000 psi (70 F, 65% RH)		30-53	44-50	64-134	29-105
Elongation at break, % (70 F, 65% RH)		25-46	33-39	13-48	9-30
Elastic recovery (70 F, 65% RH)	% recovery from % strain	92-99 2	79-97 2	97 80 2 8	82 30 2 20
Stiffness, grams/denier (70 F, 65% RH)		5.5-10.5	7.7-8.0	7-58	8.7-25
Moisture regain, %	70 F, 65% RH	1.0-2.5	<0.4-4.0	0.4	11.5-16.6
	Commercial	1.5-2.2	0	0.4	11.0
Effect of heat		Sticks at 410-490 F	Shrinks at temperatures above 248 F; fire resistant; does not support combustion	Sticks at 455 F; melts at 480 F	Does not melt
Effect of sunlight		Resistant	Some loss of strength	Some loss of strength; no discoloration; very resistant behind glass	Long exposure results i
Effect of Chemicals	Acids	Resistant to most acids	Resistant to most acids	Resistant to most mineral acids; disintegrated by 96% sulfuric acid	About same resistance at low concentrations integrates rapidly in co high temperatures.
	Alkalies	Resistant to weak alkalies; destroyed by strong alkalies at boil	Resistant	No effect, cold; disintegrated by strong alkalies at boil	No effect with cold, and loss of strength i but high modulus rayo to caustic of mercerizin
	Organic solvents	Unaffected by common solvents	Soluble in warm acetone; unaffected by most other common solvents	Generally unaffected; soluble in some phenolic compounds	Resistant
Dyestuffs used		Disperse, basic, acid, metalized, chrome, milling, direct, cationic, sulfur, vat, and naphthol	Disperse, basic, neutral-dyeing metalized and acid, cationic, some vats	Disperse, developed (azoic), cationic	Direct, developed, azoics
Uses[2]		1, 2, 3, 4, 7	1, 2, 3, 4, 5, 7	1, 2, 4, 7	1, 2, 3, 4, 5, 6, 7

[1]Foil-polyester only

[2]Uses:
1. Apparel
2. Upholstery and drapery
3. Floor coverings
4. Other home furnishings
5. Bonded materials
6. Tire cord
7. Other industrial u

Properties and uses of

See the other side of this chart for man-made fiber and yarn

	Rayon		Acetate	Triacetate	Saran	Nylon 66
um, ty	High Strength & High Modulus	Saponified Acetate				
	1.46-1.54	1.52	1.32	1.3	1.70	1.14
	3.0-5.0	7.0	1.3-1.5	1.2-1.4	up to 2	4.1-10.2
	68-75	85	60-65	70	100	85-90
	66	138	22-28	20.0-23.3	up to 44	60-149
	9-14	6	23-34	25-40	15-25	13-45
	67 59 3 5	82 67 2 5	94 23 2 20	88 43 3 10	98.5 93.0 3 10	100 8
	15-35	120	5.5	4.8-5.0	3-12	9-78
	11-13	10.0-11.5	6.0	3.2	0	4.0-4.5
	11.0	11.0	6.5	3.5	0	4.5
		Similar to rayon	Loses strength at 194-225 F; softens at 397-406 F	Before heat treatment, sticking point is 350-375 F; after heat treatment, above 464 F. Melts at 572 F	Softens at 240-280 F; melts at 340-350 F	Sticks at 445 F; melts at about 48
ults in strength loss		Similar to rayon	Similar to rayon; slightly lower per cent loss	Long exposure results in strength loss	Darkens slightly	Some strength los special types. No
tance as cotton; not harmed tions and temperatures. Dis- in concentrated acids and at .		Decomposed by strong acids; resistant to weak acids	Decomposed by strong acids; soluble in acetic acid	Similar to acetate	Resistant to most acids	Decomposed by s to weak acids
old, weak alkalies; swelling gth in concentrated alkalies, rayons are highly resistant cerizing strength.		Swelling and mercerization in concentrated alkalies; little effect cold	Saponified; little effect from weak alkalies, cold	More resistant than acetate; little effect up to pH 9.8, 205 F	Resistant, except to ammonium hydroxide	Little or none
		Resistant	Soluble in acetone, swollen or dissolved by many organic solvents. Softened in alcohol	Soluble in acetone, chloroform, and methylene chloride. Swelled by trichloroethylene	Swelled or softened by oxygen-bearing solvents at elevated temperatures	Resistant; soluble and in 90% formi
azoics, and vats		Same as rayon	Disperse, and some azoics	Same as acetate	Disperse, some azoics	Disperse, neutral-d metalized, chrome
		4, 7	1, 2, 3, 4, 5	1, 2, 4, 7	2, 3, 4, 7	1, 2, 3, 4, 5, 6, 7

trial uses

Compiled
supplied

l uses of the man-made fibers

f this chart for man-made fiber and yarn trademarks and location of producers' sales offices.

Saran	Nylon		Spandex	Olefin		
				Polyethylene		Polyprop
	Nylon 66	Nylon 6		Conventional	Linear	
1.70	1.14	1.14	1.0	0.92	0.95-0.96	0.90
up to 2	4.1-10.2	6.3-8.7	0.6-0.8	1.0-2.5	4.0-7.5	4.8-7.
100	85-90	85-90		100	100	100
up to 44	60-149	98-122		11-30	48-90	55-8
15-25	13-45	16-30	520-610	20-60	10-30	15-25
98.5 93.0 3 10	100 8	100 8	93.5-96 50	95 5	95 80 5 10	100 10
3-12	9-78	33-48		2-12	20-40	20-50
0	4.0-4.5	4.5	1.3	0	0	0
0	4.5	4.5	0.3	0	0	0
Softens at 240-280 F; melts at 340-350 F	Sticks at 445 F; melts at about 480 F	Melting range: 414-428 F. Slight discoloration when held at 300 F for 5 hours. HBT type retains 90-95% of original tenacity after 24 hr at 330 F in air	Sticks at 347 F, melts at 482 F. Yellows and degrades over 300 F	5% shrinkage at 165 F; melts at 230-250 F	Shrinks 1.6 to 7.1% at 212 F; melts at 280 F	Shrinks: 5% @ 180 7% @ 210 9% @ 240 28% @ 275 50% @ 300 Softens at 3 melts at 333
Darkens slightly	Some strength loss after long exposure, except special types. No discoloration			Some strength loss for clear filaments, less for pigmented	Same as conventional; can be stabilized	No discolor stabilized ty 95% of stre 6 months in
Resistant to most acids	Decomposed by strong mineral acids; resistant to weak acids		Slightly yellowed by dilute hydrochloric and sulfuric	Very resistant	Very resistant	Very resistan
Resistant, except to ammonium hydroxide	Little or none			Very resistant	Very resistant	Very resistan
Swelled or softened by oxygen-bearing solvents at elevated temperatures	Resistant; soluble in some phenolic compounds and in 90% formic acid		Resistant	Soluble in some solvents at temperatures above 160 F	Same as conventional	Same as conv polyethylene
Disperse, some azoics	Disperse, neutral-dyeing metalized, acid-dyeing metalized, chrome, some directs.		Selected vat, metalized, acid, disperse, and cationic	Practically undyeable	Same as conventional,	Pigmented be extrusion
2, 3, 4, 7	1, 2, 3, 4, 5, 6, 7		1	2, 7	2, 7	2, 7

Compiled by the editors of TEXTILE INDUSTRIES from information supplied by the manufacturers of the man-made fibers. Fibers of the same generic class may vary from manufacturer to manufacturer; each manufacturer may produce several types of fiber within one

AUGUST
1961

propylene	Vinyon	Metallic[1]	Glass	TFE-Fluorocarbon		
0.90	1.33	1.82	2.54	2.3	Specific gravity	
4.8-7.0	0.7-1.00	1.0	6.0-7.3	1.6	Dry (70 F, 65% RH)	Tenacity, grams/denier
100	100	100	65	100	Wet, % of dry	
55-81	12-17	15.7	200-220	47	Tensile strength, 1000 psi (70 F, 65% RH)	
15-25	100-120	70-130	3.0	13	Elongation at break, % (70 F, 65% RH)	
00 93 10 20	95 5		100 3		% recovery from % strain	Elastic recovery (70 F, 65% RH)
20-50	1.5		300	12	Stiffness, grams/denier (70 F, 65% RH)	
0	Up to 0.5	Negligible	0	0	70 F, 65% RH	Moisture regain, %
0	0		0	0	Commercial	
@ 180 F @ 210 F @ 240 F @ 275 F @ 300 F at 320 F; t 333 F	Shrinks at 150 F; melts at 250 F	Sticks at 425 F; melts at 500 F (film only; figures for yarn lower)	Nonflammable; loses up to 50% of strength at 650 F, continues to decline and softens at 1350 F	Nonflammable; gels at 620 F	Effect of heat	
scoloration, ed type retains f strength after ths in sunlight	None	Variable; depends on color and method of manufacture	None	None	Effect of sunlight	
sistant	Very resistant	Readily attacked by strong mineral acids	Resists most acids; attacked by hydrofluoric and hot phosphoric acids	Affected only by fluorine and chlorine trifluoride at high temperatures, and by molten alkali metals	Acids	Effect of chemicals
sistant	Resistant	Readily attacked by strong alkalies	Resists most alkalies; attacked by concentrated alkalies, and by hot weak alkalies		Alkalies	
s conventional ylene	Soluble in ketones and chlorinated hydrocarbons; swelled and softened by ethers, esters, and others	Variable	Unaffected		Organic solvents	
ed before	Disperse	Colored by manufacturer	Resin-bonded pigments	Practically undyeable	Dyestuffs used	
	5	1, 2, 3, 4, 5, 7	2, 7	7	Uses[2]	

urer; generic classification, and even fibers which are supposedly the same are averages or ranges; they are intended only to offer a general
one may vary slightly from lot to lot. Hence the figures given above characterization of each type of fiber.

Textile Industries

AUGUST 1961

Designations curren

A

Acele—Acetate filament yarns; Du Pont Co.

*Acetate**—Generic name for a manufactured fiber in which the fiber-forming substance is cellulose acetate**; American Viscose Corp.; Celanese Fibers Co.; Du Pont Co.; and Eastman Chemical Products, Inc.

Acrilan—Acrylic staple, tow, and fiberfill; Chemstrand Corp.

Acrilan 16—Acrylic fiber, whiter than the original Acrilan; Chemstrand Corp.

*Acrylic**—Generic name for manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 85% by weight of acrylonitrile units**; Acrilan, Creslan, Orlon, and Zefran.

Aeress—Modacrylic filament yarn; Union Carbide Chemicals Co.

Aerocor—Air-bulked fiber glass yarns; Owens-Corning Fiberglas Corp.

Agilon—High-stretch nontorque and bulked textured yarn; Deering Milliken Research Corp.

Alistran—Metallic yarn; Multi-Tex Products Corp.

Antron—Nylon filament yarn in which the filaments have a non-round ("tri-lobal") cross section; Du Pont Co.

Aristocrat—Rayon yarn, staple, and tow; American Bemberg.

Arnel—Tricaetate staple, filament, and tow; Celanese Fibers Co.

Avicolor—Solution dyed rayon staple and filament, and acetate filament, and fabrics made with these fibers; American Viscose Corp.

Avicron—Latent-crimp filament rayon (for tufted products); American Viscose Corp.

Avisco—Rayon filament, staple, and tow; acetate filament; American Viscose Corp.

Avlin—Multicellular rayon staple; American Viscose Corp.

Avril—High-strength, dimensionally stable rayon fiber; American Viscose Corp.

Avron—High-strength rayon staple; American Viscose Corp.

*Azlon**—Generic name for a manufactured fiber in which the fiber-forming substance is composed of any regenerated naturally occurring proteins**, none manufactured in the U.S.

B

Bembella—Two ends of Parfé filament special textured yarn; American Bemberg.

Bemberg—Cuprammonium rayon filament yarn; American Bemberg.

Blanc de Blancs—Improved color nylon yarn; American Enka Corp.

Briglo—Bright luster rayon filament; American Enka Corp.

C

Cadon— Nylon yarn with multilobal cross section; Chemstrand Corp.

C *Continued*

Caprolan—Nylon 6 staple and filament; Allied Chemical Corp.

Celacloud—Crimped acetate staple; Celanese Fibers Co.

Celacrimp—Textured acetate filament yarns; Celanese Fibers Co.

Celafil—Abraded acetate yarn; Celanese Fibers Co.

Celaire—Twist-set acetate; Celanese Fibers Co.

Celaloft—Bulked acetate yarn; Celanese Fibers Co.

Celanese—Yarns and fibers of various types, including acetate, triacetate, and rayon; Celanese Fibers Co.

Celaperm—Solution dyed acetate filament; Celanese Fibers Co.

Celaspun—Yarn spun from acetate staple; Celanese Fibers Co.

Celatow—Acetate tow; Celanese Fibers Co.

Chadolon—Stretch torque yarn; Chadbourn Gotham Sales Corp.

Chemstrand—Type 66 nylon yarn; Chemstrand Corp.

Chromeflex—Metallic yarn; The Metal Film Co.

Chromspun—Solution dyed acetate filament; Eastman Chemical Products, Inc.

Civona—Hollow - filament rayon yarns; Du Pont Co.

Coloray—Solution dyed rayon staple; Courtaulds (Alabama) Inc.

*Color-Sealed**—Solution dyed staple, filament, and tow, various fibers; Du Pont Co.

Comiso—High-strength rayon tow; Beaunit Mills, Inc.

Cordura—Rayon filament; Du Pont Co.

Corval—Cross-linked rayon staple, crimped and uncrimped; Courtaulds (Alabama) Inc.

Cotron—Yarns and fabrics of cotton and Avisco rayon staple; American Viscose Corp.

Covinaire—Rayon filament; Industrial Rayon Corp.

Covingtone—Rayon filament; Industrial Rayon Corp.

Creslan—Acrylic staple and tow; American Cyanamid Co.

*Crinofil**—High-denier-per-filament rayon yarn for stiff or straw-type effects; Du Pont Co.

Cumuloft—Textured nylon yarn for carpets; Chemstrand Corp.

Cupersil—Special textured dyed slub filament yarn; American Bemberg.

Cupioni—Thick-and-thin shantung-type rayon filament; American Bemberg.

Cupracolor—Solution dyed cuprammonium rayon filament; American Bemberg.

Cuprino—Special textured filament and slub yarn; American Bemberg.

D

Dacron—Polyester staple, filament, tow, and fiberfill; Du Pont Co.

Dawbarn—Saran, polyethylene, and polypropylene monofilaments; Dawbarn Brothers, Inc.

D *Continued*

DLP—Linear polyolefin monofilaments and multifilament yarns; Dawbarn Brothers, Inc.

DLP 50—Fabric-grade polypropylene monofilaments, heat stabilized; Dawbarn Brothers, Inc.

DLP 51—Fabric-grade polypropylene monofilaments, heat and sunlight stabilized; Dawbarn Brothers, Inc.

DLP 61 — Rope-grade 3000/16/0 polypropylene yarn, heat and sunlight stabilized; Dawbarn Brothers, Inc.

*Dream Slub**—Rayon novelty yarn with torpedo - shaped slubs; American Bemberg.

Duclé—Bulk textured yarn; Clarence L. Meyers & Co.

Dull-Fast—Dull rayon filament; Industrial Rayon Corp.

Dul-Tone—Rayon filament; Industrial Rayon Corp.

Durastran—Metallic yarn; Multi-Tex Products Corp.

Dy-Lok—Solution dyed rayon filaments; Industrial Rayon Corp.

Dynaloft—Textured yarn; Leon-Ferenbach, Inc.

Dynel—Modacrylic staple and tow; Union Carbide Chemicals Co.

E

Englo—Dull luster rayon filament; American Enka Corp.

Enka—Rayon and nylon fibers and yarns; American Enka Corp.

Enkatron—Multilobal nylon yarn; American Enka Corp.

Enkor—High-modulus rayon staple fiber; American Enka Corp.

Estron—Natural acetate filament; Eastman Chemical Products, Inc.

F

Fairtex—Metallic yarns; Fairtex Corp.

Fiberfrax—Ceramic (alumina-silica) fiber; The Carborundum Co.

Fiberglas—Textile glass fiber; Owens-Corning Fiberglas Corp.

Fibro—Rayon staple; Courtaulds (Alabama) Inc.

Flaikona—Continuous filament rayon flake yarn; American Bemberg.

Fluflon—Filament yarn modified by the false-twist method; Marionette Mills, Inc.

Fortisan—Regular and Type 36 saponified acetate filament; Celanese Fibers Co.

Fortrel—Polyester staple, tow, and filament; Fiber Industries, Inc. (sold through Celanese Fibers Co.).

45—Vinyon monofilaments; Polyarns, Inc.

FT—False-twist stretch yarn; Deering Milliken Research Corp.

FTF—False-twist stretch yarn, stabilized; Deering Milliken Research Corp.

G

Garan—Textile
Manville Sa

*Glass**—Generic
factured fib
ber-forming
Famco, Inc.
tin-Bacon
Johns-Manv
diglass Fibe
ning Fiberg
burgh Plate

Golden Caprolan
Allied Chem

Gro-Lon—Stretc
Nylon Co.

H

Helanca—High-s
Heberlein P

Helanca High T
use in hosi
suits, etc.;
Corp.

Helanca NT—
yarn with
stantial stre
ent Corp.

Helanca SP—Str
ing, particu
material; He

Helanca SS—H
with soft
stretch; Heb

Helanca SW—Li
yarn for ou
Patent Corp

Hemlon—Textur
Corp.

Hi-Narco—Medi
filament; No
Corp.

Hytor—Torque
tex, Inc.

I

IT—Improved st
fiber; Amer

J

Jetspun—Solutio
nylon staple
Enka Corp.

K

Kodel—Polyester
Eastman Ch

Kolorbon—Solut
nier crimpe
use in hom
ford Fibres

L

Lamé—Metallic
Mills, Inc.

Leferon—Crimpe
Leon-Ferenb

Lektroset—Twist
Industrial R

Livolon—Monofi
Chadbourn

Loftura—Acetat
Chemical Pr

Long Type "A"
with long, p
slubs; Amer

Lowland—Rayon
Enka Corp.

Trademarks of man-made fi

rrently used by American staple fiber, filament yarn, and textured yarn producers

xtile glass fiber; Johns-
le Sales Corp.
neric name for a manu-
d fiber in which the fi-
ming substance is glass**;
Inc.; Ferro Corp.; Gus-
on Manufacturing Co.;
Manville Sales Corp.; Mo-
Fibers, Inc.; Owens-Cor-
iberglas Corp.; and Pitts-
Plate Glass Co.
rolan—Nylon 6 tire yarn;
Chemical Corp.
Stretch torque yarn; Grove
Co.

ligh-stretch torque yarn;
ein Patent Corp.
gh Test—Stretch yarn for
hosiery, tights, bathing
etc.; Heberlein Patent

NT—Nontorque textured
vith soft hand and sub-
stretch; Heberlein Pat-
p.
—Stretch yarn for weav-
rticularly for ski pants
l; Heberlein Patent Corp.
S—Highly bulked yarn
soft hand and limited
Heberlein Patent Corp.
V—Limited stretch bouclé
or outerwear; Heberlein
Corp.
extured yarn; Hemmerich

Medium - tenacity rayon
t; North American Rayon

que stretch yarn; Paten-

ed strength rayon staple
American Enka Corp.

olution dyed rayon yarn,
taple and yarn; American
orp.

ester staple and tow;
n Chemical Products, Inc.
Solution dyed, heavy-de-
imped rayon staple, for
home furnishings; Hart-
pres Co.

llic yarn; Standard Yarn
nc.
imped, textured yarn;
erenbach, Inc.
Twist-set rayon filament;
al Rayon Corp.
onofilament stretch yarn;
urn Gotham Sales Corp.
etate slub yarn; Eastman
al Products, Inc.
*"A" Slub**—Rayon yarn
ng, parallel, nonentangled
American Bemberg.
ayon yarns; American
orp.

L *Continued*

Lurex—Metallic yarns; Dow Chemical Co.

Lus-Trus—Saran, nylon, polyethylene, and polypropylene monofilaments; Southern Lus-Trus Corp.

Lycra—Spandex yarn; Du Pont Co.

M

Magiloft—Textured yarn; Madison Throwing Co., Inc.

Malora—Metallic yarn; Malina Co.

Matesa—Dull cuprammonium filament; American Bemberg.

*Metallic**—Generic name for a manufactured fiber composed of metal, plastic-coated metal, metal-coated plastic, or a core completely covered by metal**; Dow Chemical Co.; Fairtex Corp.; Malina Co.; Metal Film Co.; Metlon Corp.; Multi-Tex Products Corp.; Nylco Products, Inc.; Reynolds Metals Co.; and Standard Yarn Mills, Inc.

Metlon—Metallic yarn; Metlon Corp.

*Modacrylic**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of less than 85% but at least 35% by weight of acrylonitrile units**; Dynel and Verel.

Modiglass—Glass fibers; Modiglass Fibers, Inc.

Moynel—High wet modulus rayon fiber; Courtaulds (Alabama) Inc.

Multi-Cupioni—Douppioni-type multi-entangled slub filament yarn; American Bemberg.

*Multi-Strata Slub**—Rayon novelty yarn with torpedo-shaped slubs; American Bemberg.

Mylast—Crimp-type, nontorque textured yarn; Clarence L. Meyers & Co.

N

Narco—Regular tenacity rayon filament and tow; North American Rayon Corp.

Narcon—Super high strength rayon staple and tow; North American Rayon Corp.

*Narene**—Rayon yarn; Beaunit Mills, Inc.

National—Saran monofilament, multifilament, staple, and tow; nylon monofilament; The National Plastic Products Co.

*Nub-Lite**— Nubby thick-and-thin cuprammonium filament; American Bemberg.

Nupron—Rayon filament; Industrial Rayon Corp.

Nupronium—Rayon filament; Industrial Rayon Corp.

Nylco—Metallic yarn; Nylco Products, Inc.

Nyloft—Bulked nylon multifilament yarn for carpets; Firestone Synthetic Fibers Co.

*Nylon**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polyamide having recurring amide groups

N *Continued*

as an integral part of the polymer chain**; Allied Chemical Corp.; American Enka Corp.; Chemstrand Corp.; Dawbarn Brothers, Inc.; Du Pont Co.; Firestone Synthetic Fibers Co.; Industrial Wire & Plastics Co., Inc.; The National Plastic Products Co.; North American Rayon Corp.; Nypel Corp.; Poliafil, Inc.; Polyarns, Inc.; Southern Lus-Trus Corp.; and U. S. Rubber Co.

Nypel—Nylon monofilaments; Nypel Corp.

*Nytril**—Generic name for a manufactured fiber containing at least 85% of a long-chain polymer of vinylidene dinitrile, where the vinylidene dinitrile content is no less than every other unit in the polymer chain**; none manufactured in the U. S.

O

Olane—Polypropylene staple and filament; AviSun Corp.

*Olefin**—A manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 85% by weight of ethylene, propylene, or other olefin units**; American Manufacturing Co., Inc.; American Thermoplastics Corp.; AviSun Corp.; Dawbarn Brothers, Inc.; Firestone Synthetic Fibers Co.; Hercules Powder Co.; Industrial Plastic Co.; Industrial Wire & Plastics Co., Inc.; The National Plastic Products Co.; North American Rayon Corp.; Plymouth Cordage Co.; Polyarns, Inc.; Puritan Cordage Co., Inc.; Reeves Brothers, Inc.; Southern Lus-Trus Corp.; U. S. Rubber Co.; and Vogt Manufacturing Corp.

Ondelette—Rayon yarn with randomly spaced, entangled slubs of irregular size and shape; Du Pont Co.

Orlon—Acrylic staple, tow, and filament; Du Pont Co.

Orlon Sayelle—Bi-component acrylic fiber; Du Pont Co.

P

Parfé—Filament rayon yarn with color spaced intermittently along its length; American Bemberg.

Perlglo—Semidull luster rayon yarn; American Enka Corp.

Poliafil—Nylon yarn and monofilaments; Poliafil, Inc.

*Polyester**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 85% by weight of an ester of a dihydric alcohol and terephthalic acid**; Dacron, Fortrel, Kodel, and Vycron.

P *Continued*

Polynosic—Descri
trel fiber; Ha

PPG—Textile gla
Plate Glass C

Premier—Rayon
Rayon Corp.

Prolene—Olefin
ber; Hercules

R

Rayflex—High-st
ment; Americ

*Rayon**—Generic
factured fibe
generated ce
manufactured
of regenerate
substituents
more than 15
of the hydrox
ican Bember
Corp.; Ameri
Beaunit Mills
bers Co.; Cou
Inc.; Du Pon
Mills, Inc.; H
Industrial Ra
American R
Skenandoa Ra

Reevon—Olefin
bers and yar
multifilament
and yarns; an
filaments; Re

Reymet—Metallic
ple; Reynolds

Rovana—Saran
Dow Chemica

Royalene—Olefin
ber Co.

S

Saaba—Bulked y
fying false-t
Leesona Corp

*Saran**—Generic
factured fibe
ber-forming
long-chain
composed of
weight of v
units**; Daw
Dow Chemic
Synthetic Fib
tional Plastic
Southern Lus

Saranspun—Yarn
not more t
dyed rayon;
Products Co.

Skybloom—High-
ple fiber f
American En

Skyloft—Bulked
can Enka Co

Softflo—Soft lu
American En

*Spandex**—Gener
ufactured fib
fiber-forming
long-chain
comprised of
segmented p
pont Co., I
Corp., and U.

Spectrain—Solutio
ple; Chemstra

FREE REPRINTS *of this chart are available, on th*
Write to the Editors, "Textile Industries,"

nade fibers and where to get them

yarn producers

P *Continued*

Polynosic—Descriptive term for Zantrel fiber; Hartford Fibres Co.

PPG—Textile glass fiber; Pittsburgh Plate Glass Co.

Premier—Rayon filament; Industrial Rayon Corp.

Prolene—Olefin (polypropylene) fiber; Hercules Powder Co.

R

Rayflex—High-strength rayon filament; American Viscose Corp.

*Rayon**—Generic name for a manufactured fiber composed of regenerated cellulose, as well as manufactured fibers composed of regenerated cellulose in which substituents have replaced not more than 15% of the hydrogens of the hydroxyl groups**; American Bemberg; American Enka Corp.; American Viscose Corp.; Beaunit Mills, Inc.; Celanese Fibers Co.; Courtaulds (Alabama) Inc.; Du Pont Co.; Fair Haven Mills, Inc.; Hartford Fibres Co.; Industrial Rayon Corp.; North American Rayon Corp.; and Skenandoa Rayon Corp.

Reevon—Olefin (polypropylene) fibers and yarns, staple, tow, and multifilaments in fine deniers and yarns; and bristles in monofilaments; Reeves Brothers, Inc.

Reymet—Metallic filament and staple; Reynolds Metals Co.

Rovana—Saran flat monofilaments; Dow Chemical Co.

Royalene—Olefin yarns; U. S. Rubber Co.

S

Saaba—Bulked yarn made by modifying false-twist stretch yarn; Leesona Corp.

*Saran**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 80% by weight of vinylidene chloride units**; Dawbarn Brothers, Inc.; Dow Chemical Co.; Firestone Synthetic Fibers Co.; The National Plastic Products Co.; and Southern Lus-Trus Corp.

Saranspun—Yarn blend of saran and not more than 30% solution dyed rayon; The National Plastic Products Co.

Skybloom—High-crimp rayon staple fiber for tufting yarns; American Enka Corp.

Skyloft—Bulked rayon yarn; American Enka Corp.

Softflo—Soft luster rayon yarn; American Enka Corp.

*Spandex**—Generic name for a manufactured fiber in which the fiber-forming substance is a long-chain synthetic polymer comprised of at least 85% of a segmented polyurethane**; Du pont Co., International Latex Corp., and U. S. Rubber Co.

Spectrain—Solution dyed Acrilan staple; Chemstrand Corp.

S *Continued*

Spun-Black—Black solution dyed rayon filament; Industrial Rayon Corp.

Spunized—Crimp - type nontorque continuous filament bulked yarn; Spunize Co. of America, Inc.

Strata - Slub—Thick-and-thin cuprammonium rayon filament; American Bemberg.

Stratella—Thick-and-thin filament yarn; American Bemberg.

Strawn—Flat, strawlike monofilament rayon yarn for use in drapery and upholstery fabrics; Industrial Rayon Corp.

Stretch-Ever—Spandex yarn; International Latex Corp.

Super Cordura—High tenacity rayon filament; Du Pont Co.

Super L—Smooth, soil-resistant rayon carpet staple; American Viscose Corp.

Superloft—Filament yarn modified by the false-twist method; Leesona Corp.

Super-Narco—High tenacity rayon filament; North American Rayon Corp.

Super Rayflex—High-strength filament rayon, about 40% stronger than Rayflex; American Viscose Corp.

Suprenka—Extra high tenacity rayon filament; American Enka Corp.

Suprenka Hi Mod—High modulus rayon yarn for industrial uses; American Enka Corp.

T

Taslan—Loop-type, nonstretch bulked yarn; Du Pont Co.

Teflon—TFE - fluorocarbon staple, filament, and tow; Du Pont Co.

Tempra—High tenacity rayon filament; American Enka Corp.

Tenlon—High-strength rayon staple fiber; American Enka Corp.

Textralized—Crimp - type, stretch nontorque yarn; Joseph Bancroft & Sons Co.

*Thick and Thin**—Continuous filament rayon flake yarns having thick and thin portions; Du Pont Co.

*Tinselfil**—Rayon yarn having high luster and crystal-like sparkle; Du Pont Co.

*Triacetate**—Generic name for a manufactured fiber in which the fiber-forming substance is cellulose acetate, with not less than 92% of the hydroxyl groups acetylated**; Arnel.

Tuff-Lite-L—Oriented polyethylene monofilaments; Industrial Plastic Co.

Tuff-Lite-P—Oriented polypropylene monofilaments; Industrial Plastic Co.

Tusson—Shantung-type dull luster slubbed filament yarn; American Bemberg.

Tycora—Textured filament yarns; Textured Yarn Co., Inc.

Tyrex—Certification mark for rayon tire cord; Tyrex, Inc. (American Enka Corp.; American Viscose Corp.; Beaunit Mills, Inc.; and Industrial Rayon Corp.).

Tyron—High tenacity rayon filament; Industrial Rayon Corp.

U

Ultrastrand—Textile glass fibers; Gustin-Bacon Manufacturing Co.

Ultravat—Metallic yarn; Metlon Corp.

Unifab—Textile glass fibers in fabric form; Ferro Corp.

Uniformat—Textile glass fibers in mat form; Ferro Corp.

Unirove—Textile glass fibers in woven roving form; Ferro Corp.

Uniroving—Textile glass fibers in roving strand form; Ferro Corp.

Unitape—Textile glass fibers in woven edge tape form; Ferro Corp.

V

Velon—Saran monofilaments; Firestone Synthetic Fibers Co.

Velon LP—Linear polyethylene monofilaments; Firestone Synthetic Fibers Co.

Venturia—Air-bulked yarn; Leon-Ferenbach, Inc.

Verel—Modacrylic staple and tow; Eastman Chemical Products, Inc.

Veri - Dul—Dull rayon filament; Skenandoa Rayon Corp.

*Vinal**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 50% by weight of vinyl alcohol units, and in which the total of the vinyl alcohol units and any one or more of the various acetal units is at least 85% by weight of the fiber**; none manufactured in the U.S.

*Vinyon**—Generic name for a manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 85% by weight of vinyl chloride units**; American Viscose Corp.; Polyarns, Inc.; and Vogt Mfg. Corp.

Vitron—Textile glass fiber; Johns-Manville Sales Corp.

Voplex—Olefin and vinyon monofilaments; Vogt Mfg. Corp.

Vycron—Polyester staple, tow, and filament; Beaunit Mills, Inc.

Vyrene—Spandex yarns; U. S. Rubber Co.

W

Wynene—Olefin monofilaments; The National Plastic Products Co.

Z

Zantrel—High-modulus and high-tenacity, dimensionally stable rayon ("Polynosic") fiber; Hartford Fibres Co.

Zefran—Acrylic staple and tow; Dow Chemical Co.

*Not a trademark.
**As defined in the Textile Fiber Products Identification Act.

Fiber Marketin
Allied Chemica
261 Madison A
New York 16, N

American Bem
261 Fifth Avenu
New York 16, N

American Cyan
Fibers Division
111 West 40th S
New York 18, N

American Enka
Enka, N. C.

American Manu
Noble and West
Brooklyn 22, N.

American Ther
750 Union Aven
Union, New Jer

American Visco
350 Fifth Avenu
New York 1, N.

AviSun Corp.
1345 Chestnut S
Philadelphia 7,

Joseph Bancrof
Wilmington 99,

Beaunit Mills, I
Fibers Division
261 Fifth Aven
New York 16, N

The Carborundu
P. O. Box 337
Niagara Falls, N

Celanese Fibers
522 Fifth Avenu
New York 36, N

Chadbourn Goth
401 Fifth Avenu
New York 16, N

Chemstrand Co
350 Fifth Avenu
New York 1, N.

Courtaulds (Ala
600 Fifth Avenu
New York 20, N

Dawbarn Broth
Waynesboro, Vi

Deering Millike
P. O. Box 1927
Spartanburg, S.

his chart are available, on the basis of one per reader, as long as the supply lasts.
Editors, "Textile Industries," 1760 Peachtree Rd., N. W., Atlanta 9, Ga.

Sales offices of fiber producers and licensors of textured yarn patents

rketing Department
emical Corp.
on Avenue
16, N. Y.

Bemberg
Avenue
16, N. Y.

Cyanamid Co.
vision
40th Street
18, N. Y.

Enka Corp.
C.

Manufacturing Co., Inc.
West Streets
22, N. Y.

Thermoplastics Corp.
Avenue
w Jersey

Viscose Corp.
Avenue
1, N. Y.

orp.
nut St.
ia 7, Pa.

ncroft & Sons Co.
n 99, Delaware

lls, Inc.
ision
Avenue
16, N. Y.

rundum Co.
337
lls, N. Y.

ibers Co.
venue
36, N. Y.

Gotham Sales Corp.
venue
16, N. Y.

d Corp.
venue
1, N. Y.

(Alabama) Inc.
venue
20, N. Y.

Brothers, Inc.
o, Virginia

lliken Research Corp.
927
g, S. C.

Dow Chemical Co.
Textile Fibers Department
Williamsburg, Virginia

E. I. du Pont de Nemours & Co.
Textile Fibers Department
Wilmington 99, Delaware

Eastman Chemical Products, Inc.
P. O. Box 431
Kingsport, Tennessee

Fair Haven Mills, Inc.
Fair Haven, Vermont

Fairtex Corp.
1808 Liberty Life Bldg.
Charlotte 2, N. C.

Famco, Inc.
6200 Strawberry La.
Louisville, Ky.

Ferro Corp.
Fiber Glass Rd.
Nashville 11, Tenn.

Fiber Industries, Inc.
P. O. Box 1882
Charlotte, N. C.

Firestone Synthetic Fibers Co.
45 Rockefeller Plaza
New York 20, N. Y.

Grove Nylon Co.
150 E. Grove St.
Scranton 10, Pa.

Gustin-Bacon Manufacturing Co.
210 West 10th Street
Kansas City 5, Missouri

Hartford Fibres Co.
140 Madison Avenue
New York 16, N. Y.

Heberlein Patent Corp.
350 Fifth Avenue
New York 1, N. Y.

Hemmerich Corp.
Denver, Pa.

Hercules Powder Co.
900 Market Street
Wilmington 99, Del.

Industrial Plastic Co.
216 Tingley Lane
Metuchen, New Jersey

Industrial Rayon Corp.
500 Fifth Avenue
New York 36, N. Y.

Industrial Wire & Plastics Co., Inc.
Spirit Lake, Iowa

International Latex Corp.
Playtex Park
Dover, Delaware

Johns-Manville Sales Corp.
22 East 40th Street
New York 16, N. Y.

Leesona Corp.
P. O. Box 6088
Providence 4, R. I.

Leon-Ferenbach, Inc.
274 Madison Avenue
New York 16, N. Y.

Madison Throwing Co., Inc.
Madison, North Carolina

Malina Co.
125 W. 41st St.
New York 36, N. Y.

Marionette Mills, Inc.
Birch and Woods Streets
South Coatesville, Pa.

Metal Film Co., Inc.
40 Worth Street
New York 13, N. Y.

Metlon Corp.
432 Fourth Avenue
New York 16, N. Y.

Clarence L. Meyers & Co.
2nd and Somerset Streets
Philadelphia 33, Pa.

Modiglass Fibers, Inc.
P. O. Box 86
Bremen, Ohio

Multi-Tex Products Corp.
56 Elm Street
Newark 5, N. J.

The National Plastic Products Co.
Odenton, Maryland

North American Rayon Corp.
261 Fifth Avenue
New York 16, N. Y.

Nylco Products, Inc.
530 Main Street
Clinton, Mass.

Nypel Corp.
W. Conshohocken, Pa.

Owens-Corning Fiberglas Corp.
717 Fifth Avenue
New York 22, N. Y.

Patentex, Inc.
666 Fifth Avenue
New York 19, N. Y.

Pittsburgh Plate Glass Co.
One Gateway Center
Pittsburgh 22, Pa.

Plymouth Cordage Co.
Plymouth, Mass.

Poliafil, Inc.
311 Palm Street
Scranton, 5, Pa.

Polyarns, Inc.
545 North Main St.
Canandaigua, N. Y.

Puritan Cordage Co., Inc.
1205 East Washington St.
Louisville 6, Kentucky

Reeves Brothers, Inc.
1071 Ave. of the Americas
New York 18, N. Y.

Reynolds Metals Co.
Reynolds Metals Bldg.
Richmond 18, Virginia

Skenandoa Rayon Corp.
261 Fifth Avenue
New York 16, N. Y.

Southern Lus-Trus Corp.
P. O. Box 3386
Jacksonville 6, Florida

Spunize Co. of America, Inc.
Unionville, Connecticut

Standard Yarn Mills, Inc.
62-05 30th Avenue
Woodside 77, N. Y.

Textured Yarn Co., Inc.
40 East 34th Street
New York 16, N. Y.

Tyrex, Inc.
Empire State Bldg.
New York 1, N. Y.

Union Carbide Chemicals Co.
Textile Fibers Department
270 Park Avenue
New York 17, N. Y.

U. S. Rubber Co.
1230 Ave. of the Americas
New York 20, N. Y.

Vogt Manufacturing Corp.
100 Fernwood Avenue
Rochester 21, N. Y.

MODERN TEXTILE MANAGEMENT

Article 6—Sales Anticipation Curves, a management planning and control aid

by Norbert Lloyd Enrick[1]

Exclusive

SALES anticipation curves as an aid in management's coordination of sales, production schedules, and inventory buildups have been introduced only recently into the textile industry[2]. The benefits attained, however, have often been considerable. One installation, made with the author's assistance, yielded cost savings after the first year of operation estimated at one half of one per cent of the net worth of the company.

Savings attained from the use of sales anticipation curves in management planning will vary with market factors. The highest savings would normally accrue to a company supplying a wide variety of styles to the trade. During the peak season, such a mill will usually not be able to simply produce to order, because of excess demand. Consequently, an inventory must be built up during the early season, based on anticipated orders for the various styles.

It is here where the Sales Anticipation Curves aid in planning production and building up inventories in such a manner as will minimize undue excess or embarrassing shortages of stock.

Developing the Curves. In developing Sales Anticipation Curves, the past pattern of annual sales serves as a starting point. Records going back from two to eight years may be used for this purpose. As a rule, however, only from three to five years are desirable. Less than three years would usually present an unstable picture of past performance patterns, while more than five years would be likely to include obsolete and non-representative past market patterns.

The typical illustration, in *Table 1*, utilizes the performance of one style for the preceding three years. The Sales Anticipation Curve is then obtained as follows:

1. Using the monthly past sales data, under "Sales in 10,000 Yd Cumulative," obtain each month's percentage of the year's total.

[1]Associate Professor, University of Virginia Graduate School of Business Administration.

[2]D. B. Hertz and K. H. Schaffir, Operations Research in the Textile Industry, *Chronicle*, December 1959 (Arthur Andersen & Co.).

TABLE 1: Development of Sales Anticipation Curve for a Typical Fabric Style

	Sales in 10,000 Yd. Cumulative			Sales in Per Cent of Year's Total					
Month	'58-'59	'59-'60	'60-'61	'58-'59	'59-'60	'60-'61	3-Yr Avg	Range*	Control Limit**
Oct	5	2	15	3	1	5	3	4	±3.6
Nov	16	8	30	10	4	10	8	6	5.4
Dec	32	30	78	20	15	26	17	11	9.9
Jan	40	56	93	25	28	31	28	6	5.4
Feb	50	82	144	31	41	48	40	17	15.3
Mar	74	102	177	46	51	59	52	13	11.7
Apr	82	124	182	51	62	64	59	13	11.7
May	94	150	207	59	75	69	69	16	14.4
Jun	107	160	234	67	80	78	75	13	11.7
Jul	117	170	255	74	84	85	81	11	9.9
Aug	136	184	270	85	92	90	89	7	6.3
Sep	160	200	300	100	100	100	100	0	0

*Range = Highest - Lowest Year. Thus for October, 5 - 1 = 4.

**Control Limit = Range × Factor (from Table II) Thus, for October, 4× ± 0.9 = ± 3.6. The Control Limit is now shown in Figure 1 at the 3-Year Average of 3 ± 3.6, yielding 6.6 and 0. (Theoretically, 3 - 3.6 = — 0.6, but actually sales would never be below the Lower Control Limit of 0.)

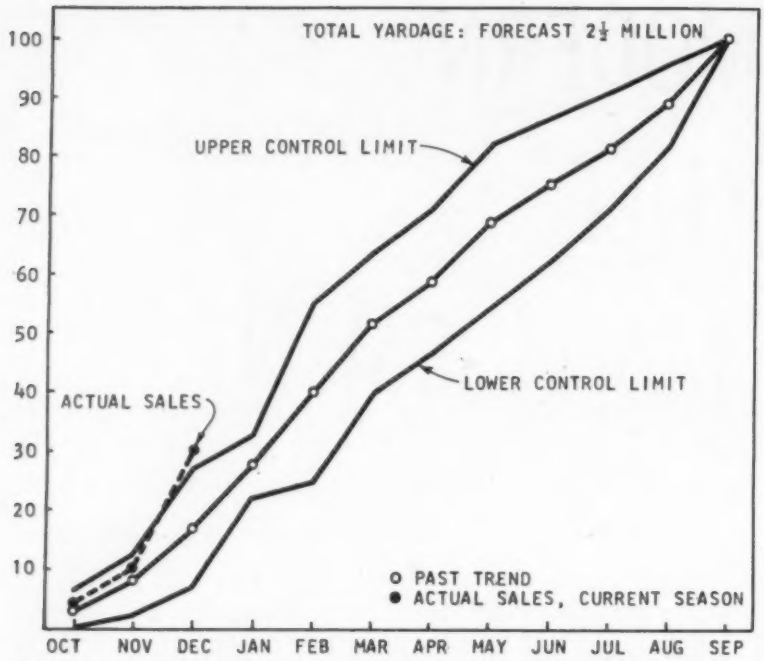


FIG. 1. Sales Anticipation Curve, showing past pattern of trend, control limits, and actual current season sales.

Since the year is the "season-year," the cumulative sales figure for September represents also the year's total sales. Thus, for October 1959, the sales in 10,000 yards of 2 expressed as a per cent of the end-of-year 200 for September 1960 is one per cent, as shown in the "1959-60" column for October, under "Sales in Per Cent of Year's Total."

2. Find the sales pattern for this style, by averaging the percentage entries for each month. The resultant pattern, plotted as the center curve in *Figure 1*, is shown in terms of monthly sales as a *per cent* of total annual sales. The pattern is thus free from any *yardage* problems.

3. To obtain the Control Limits around the sales pattern curve, we obtain the ranges for each month. Thus, for October, the three sales percentages are 3, 1, and 5. Subtracting the lowest figure, 1, from the highest figure, 5, yields 4 as the Range. This range, multiplied by the appropriate conversion factor of 0.9 from *Table 2*, yields ± 3.6 as the Control Limit. For plotting purposes, the October average of 3 plus 3.6 yields 6.6 as an upper Control Limit. The lower Control Limit, however, is zero, since 3 minus 3.6 would yield a (theoretically) negative value. Actually, of course, sales will not be below zero. For November, the average of 6 ± 5.4 would be plotted at the levels of 10.4 and 0.6 on the chart in *Figure 1*, for the upper and lower Control Limits.

The Sales Anticipation Curve thus obtained reveals the following information:

First of all, it shows the past behavior of sales, from the start to the conclusion of the season. Each style or style group may have its own characteristic pattern, depending upon whether it represents dress goods, shirting materials, or other end uses, or whether it represents various types of fibers, weaves, or finishes. Thus one would not only expect a different pattern for corduroys than for velveteens, but also different patterns among various type of corduroy and velveteen fabrics and finishes.

Next, it shows the limits within which variations in the actual sales may occur, as a result of normally expected fluctuations. The clerk in the Sales Department, who is plotting the actual sales on the chart, can thus be instructed that he should call to the attention of sales and production management only those styles or style groups where actual sales have fallen *outside* the Control Limits. Thus executive time expended on revising the total season's forecast of sales or adjusting production schedules to meet the revised forecast, is confined to only those instances where an out-of-control point on the chart actually indicates this need. As long as sales for a style stay "in control," valuable management time is not imposed upon.

Finally, it provides sales management with an early indication of the developing trends of sales in the various styles and style groups. Styles on which sales expectations at the year's outset have been over-optimistic can be revised in terms of (a) increased promotional effort, or (b) reduced production rates, so as to avoid accumulation of inventories that must be sold at distress prices by the end of the season. Styles on which sales expectations turn out to have been too low may be revised upward, thus avoiding embarrassing shortages of goods during the peak of the season.

TABLE 2: Control Limit Factors for Fabric Sales Anticipation Curves

Yr Used Per Range	Control Limit Factor
2	±0.9
3	0.6
4	0.5
5	0.4
6	0.4
8	0.35
10	0.3

BASIS OF FACTORS: The factors shown result in control limits of ± 1 standard deviation around the average sales of the past years. Thus, when an average in the current year falls outside control limits, odds are 1 out of 3 that a significant shift in the sales pattern has occurred, warranting review of the trends by the responsible sales executive.

Using the Curve. Let us assume that the sales department has made a forecast of 2½ million yards for the fabric represented in Table 1. In October, orders for 100 thousand yards of the fabric were received, or 4 per cent of the total forecast. This 4 per cent of actual sales is plotted in *Figure 1*.

In November, 150 thousand yards were sold, making a cumu-

TABLE 3: Development of Weekly Production Schedule for a Typical Fabric Style

Calculation Steps	Fabric, 1,000 Yd
a. Actual present inventory	400
b. Desired safety stock	100
c. Working inventory, (a)-(b)	300
d. Expected sales through peak season months	2,000
e. Shipped to date	200
f. Total production required (d)-(e)	1,800
g. Weeks remaining through peak season months—40	
h. Weekly production required, (f) ÷ (g)	45
i. Production per loom per week	0.9
j. Looms required to be run on this style per week—50	

CONCLUSION: For constant production aimed at meeting peak season demand and ending peak season with only the safety stock on hand, 50 looms should be assigned to this style.

lative November total of 100 + 150 or 250 thousand, representing 10 per cent of the over-all forecast. This again is plotted.

In December the cumulative sales reached 750,000 or 30 per cent. This value plots above the upper Control Limit of 26.9 per cent. It is therefore desirable to review this style and, if over-all sales expectation is revised upward, to similarly adjust the mill production schedules by putting more looms on this style.

Revisions in production schedules to meet revised sales expectations will often be self-compensating. Looms taken off one style that proved a slow seller may need to be started on another style that exceeded expectations. At other times, of course, over-all adjustments may be required by market conditions. Here again, however, the Sales Anticipation Curves are helpful, since they permit gradual adjustment in production schedules in place of sudden changes.

Supplementary to the Sales Anticipation Curves, similar Curves for Shipment Anticipation and Inventory Accumulation may be prepared, using the methods shown in *Table 1*, but substituting shipment and inventory data. Actually, the planning of production on the basis of Shipment Anticipation Curves is preferred by some persons. The Shipment Anticipation Curve lags behind the Sales series, and is therefore less desirable from a viewpoint of sales control. Planning of loom schedules to meet shipping requirements requires relatively simple steps, such as illustrated in *Table 3*.

Savings and Benefits. When considering the installation of Sales Anticipation Curves as management planning and decision-making aids, it is helpful to review the benefits attainable and actually being reaped from existing installations:

- Savings in interest expense because of controlled finished goods inventories, based on sales-coordinated production.
- Minimal or no distress goods at end of season.
- Better ability to meet peak-season demands of customers.
- Smoother production schedules, fewer abrupt changes.
- Reduced floor space for finished goods inventory.
- Lower labor cost in handling inventory.
- Less spoilage of goods in inventory.
- Lowered insurance costs and smaller inventories.

There are also many intangible benefits, arising from improved management information, the knowledge that operations are properly coordinated, and generally enhanced over-all effectiveness of management planning and control.

Acknowledgment

Appreciation is expressed for release of the cost savings and management benefit data in this article, by the mill group for whom the author worked in a consulting capacity in the installation of the Sales Anticipation Curves. The data were originally published in a guest-speaker presentation by the company in the author's course on Quantitative Methods for Business Management at the University of Virginia.

(The first article of this series appeared in the March, 1961, issue. The seventh will deal with market survey aids.—The Editors)

Crash program needed, Robertson told SCTMA

Staff report

■ THE COMBINATION of economic pressures and government policies demand that the dream textile mill come not in the distant future but that it be achieved as soon as is financially and technologically possible, *W. F. Robertson*, president of the South Carolina Textile Manufacturers Association, told those assembled for the group's recent annual meeting at Sea Island, Ga.

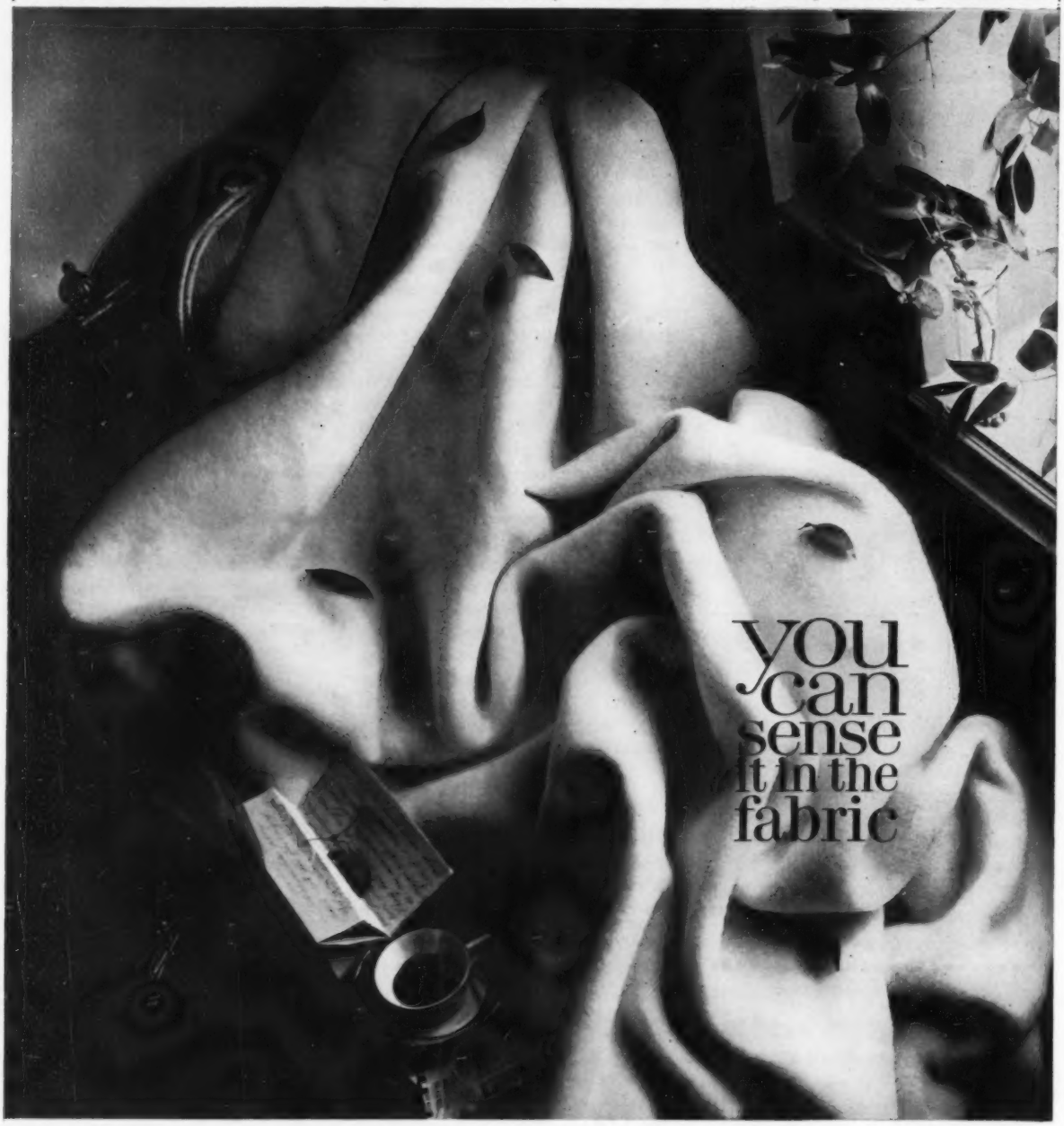
This rapid transition requires nothing less than a crash program on the part of every segment of our economy, Mr. Robertson emphasized to the largest number of textile men yet to attend the convention.

Forces of circumstances fall into two general areas. Our market at home and abroad is one; government influence on our operations is the other. There have been changes in both areas: (1) Government foreign trade policies have permitted a rising flood of imports. (2) Exports of our products steadily decline. (3) Government forces us to operate in a more costly environment than overseas competitors (artificially high price of cotton, for example). (4) Government controls in the fields of taxes and depreciation. All of these conditions leave us in an unfair competitive situation in any open market, and they will force us to automate or liquidate, Mr. Robertson said.

Although complete automation would come to the textile industry eventually, compelling forces over which we have no control require our industry to revise its approach and speed up its timetable. The textile industry must reach forward with increasing willingness to grasp new techniques and machines.

Technological improvements will demand more highly skilled individuals, and the ratio of workers to production obviously must and will be changed. This means fewer jobs —but there will be better jobs, Mr.

AS APPEARING IN: New York Times, House Beautiful, House and Garden, Living for Young Homemakers



The Lightness of Creslan...the fiber with the six senses of fashion.

Lightness is one of the six senses of fashion. It is airiness, grace, serenity...an effortless ease. In its gentle manner, it makes everyday living a lighthearted pleasure.

Now, Creslan acrylic fiber is breezing a buoyant sense of lightness through our fashions and home furnishings. Creslan makes fabrics cloud-light, soft, and comfortable...giving warmth in winter, icy coolness that keeps crisp in summer. Look for them. You'll love all six senses: lightness, color, vitality, taste, touch, and beauty. American Cyanamid Co., N. Y.

Offices: 111 West 40th St., N. Y.; 3333 Wilkinson Blvd., Charlotte, N. C.; 2300 South Eastern Ave., Los Angeles, Cal.; 40 Fountain St., Providence, R. I.

CYANAMID

Creslan®

LUXURY ACRYLIC FIBER

For further information use Handy Return Card, Page 191

Robertson indicated.

Mr. Robertson was re-elected to serve a full term as president of SCTMA. He is vice-president of Riegel Textile Corp., Ware Shoals, S. C., and has served a partial term as president, succeeding G. P. McClenaghan, who resigned for reasons of health.

Robert S. Small, president of Woodside Mills, Greenville, S. C., was elected vice-president of the association. He had been serving as vice-president by appointment since Mr. Robertson became president of the association.

Four new members were elected to the association's board of directors: *James W. Harrell*, vice-president, J. P. Stevens & Co., Inc., Greenville, S. C.; *J. J. Lyons*, vice-president, M. Lowenstein and Sons, Inc., Anderson, S. C.; *Joe D. Moore*, vice-president, Reeves Bros., Inc., Spartanburg, S. C.; and *L. A. Savage*, vice-president, The Kendall Co., Charlotte, N. C.

Mill studies effect of cotton's short fibers on processing, quality

■ A SMALL increase in the short fiber content of bale stock will have a significant effect on processing efficiency and yarn quality, a study by West Point Mfg. Co. indicates. Magnitude of the effect is shown by the following theoretical speculations which were made from data obtained:

If bale stock short fiber content is increased 1 percentage point, the ends down rate will be increased by 20 to 25% and count strength product decreased from 1.5 to about 7.0%.

E. H. McAngus of West Point's research department gave a report of the study to textile mill management and operating executives who attended the recent ACMI Fiber Testing Laboratory Open House in Clemson, S. C.

About 400 bales of Memphis territory 1" Middling cotton were scanned to find three bales that had similar, normally measured properties with the exception of per cent short fibers. Quantity of short fibers (½" and less) in the three bales selected for testing was: 5.17%; 12.3%; 17.4%.

During processing an effort was made to process part of each bale simultaneously in order to eliminate some of the processing variables. The spinning was run so that each bale with a different percentage of short fiber was represented in spinning at any given time. The processing equipment was identical for all lots processed and no adjustments of any kind were made on any of the equipment while the study was in progress. All lots of each stock were processed on all spindles available on both roving and spinning in order to eliminate frame differences. Quality checks were made on all processes beginning with carding, and an additional test for per cent short fiber was made on a composite card sliver sample from each lot to verify the original testing.

The work was summarized in general as follows:

1. Opening, picking, and carding waste increases with an increase in the percentage of short fibers in the bale stock.
2. Unevenness in all preparatory processes increases with an increase in the percentage of short fibers in the bale stock.
3. Strength, both skein and single end, decreases with an increase in the percentage of short fibers in the bale stock.
4. Clearer waste through roving increases with an increase in the percentage of short fibers in the bale stock.
5. Ends down in spinning increases with an increase in the percentage of short fibers in the bale stock.
6. ASTM appearance grades decrease approximately one grade for each 5% increase in short fiber content of bale stock.

First quarter medium grade wool imports show sharp rise

■ IMPORTS of medium grade apparel wools during the first three months of 1961 increased one-fourth over the 1960 volume, The Wool Bureau reported recently. As a result, imports of wools graded finer than 56s accounted for over four-fifths of the 1961 imports as compared with less than three-fourths for the corresponding period last year. Imports of all grades of apparel wool during the first quarter dropped 10 per cent from a year ago, reflecting the recession in the United States mill consumption of wool which reached a low point in December 1960.

A statistical comparison covering apparel wool imports for the months of January-March 1960 and 1961 just released by the Bureau shows that the combined market share of wools from Argentina and Uruguay rose from over one-fifth of the 1960 total to under one-third of the 1961 total. An offsetting decline occurred in the combined market share of imports from Australia, New Zealand, and The Union of South Africa. Nevertheless, the Bureau stated, these countries maintained their dominance in this import market with two-thirds of the total.

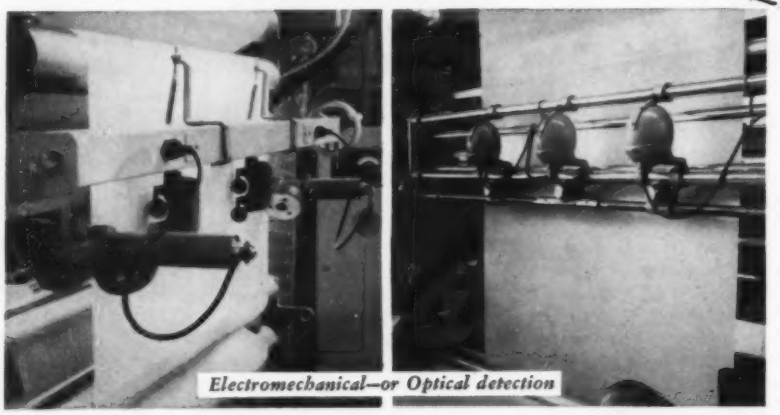
The reason for this shift, the Bureau explained, is that the South American countries started the season with a huge carryover from their previous season's clips. In order to dispose of this carryover, in addition to their current clips, the Argentine and Uruguayan governments modified their export taxes and export exchange rates to bring their wool prices in line with world wool values. The bulk of their exportable supplies having been sold, U. S. demand for foreign apparel wools is likely to shift to Australia, New Zealand, and The Union of South Africa for the remainder of this season.

A shift in the sources of duty-free carpet wool imports was also reported in the Bureau's quarterly report. New Zealand's share of total imports increased from 18 per cent of the 1960 first quarter total to 23 per cent of the corresponding 1961 total. Since New Zealand achieved an equal market status with Argentina in annual 1960 U. S. imports of carpet wools, the Bureau said, it is probable that the first quarter gains registered by New Zealand will expand as its wool selling season reaches a climax and even give New Zealand a slight edge over South America for the entire year of 1961.

FACTS, FIGURES AND IDEAS DESIGNED TO SAVE YOU TIME AND MONEY

web control NEWS

Volume 1, Number 1



Electromechanical—or Optical detection

Announcing... Completely Automatic BOWED AND SKEWED Weft Straightening Equipment

Taunton, Mass., April 1, 1961—After more than 25 years of development, Mount Hope Machinery Co. is proud to announce completely successful results at the World's first commercial installation of automatic bow and skew weft straightening equipment with both optical and electromechanical detection.

The installation in question, a finishing plant, made an ideal test because as many as 25 different fabrics—of widely varying weights and weaves—are run each day. Because of this variety, management decided to install both electromechanical (BOW SKEW LINER) and optical (ORTHO-MAT) detection systems—the optical for sheers and delicate fabrics; the mechanical for more traditional or complicated weaves. (In 9 out of 10 cases only one detection system is necessary, however.)

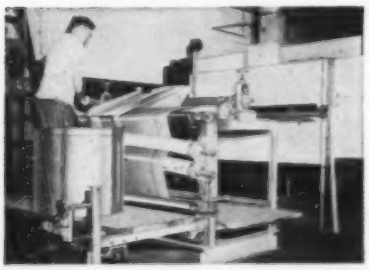
The results have been impressive:

1. One machine (a new Drying Range into which the Mount Hope equipment is incorporated) now turns out more than twice as much cloth as the previous equipment.

2. The finished cloth has no bows, skews or other handling imperfections. Re-runs have been cut to practically zero along with elimination of "seconds."

3. There is a considerable labor saving and upgrading. Before, an operator had to be on constant duty with the tedious job of watching the cloth and straightening it by hand. This operation is completely eliminated.

The complete story of this installation is scheduled to be reported in an article soon to appear in a leading textile journal.



Baloney Rolls, Banana Rolls, Crazy Rolls...

What do you call them? We call them MOUNT HOPE ROLLS and FREE WHEELING EXPANDERS.

There's no argument about their value, though, for protecting cloth from wrinkles, baggy centers, loss of width and distortion.

If you don't already have them, why not send for our Technical Data Sheets. Many plant men refer to them as their "Handbook of Cloth Handling Problems."

Save $125 A Day With Each CRF

A typical Print Room has operating costs averaging $125 an hour. A printing machine running 24,000 yards per shift in 2,000 yard rolls is stopped 12 times a shift.

The resulting lost time and cloth spoilage *could* be costing you $125 a day or more per machine. A Mount Hope CONTINUOUS ROLL FEED can pay for itself out of savings in a few months and then go on paying dividends year after year after year.

Web Viewer Stops Motion, Shows Every Inch of Length and Width of Web

Now with Mount Hope's remarkable new Barr & Stroud WEB VIEWER you need not stop your press to check register.

There are many other advantages, too:

1. No need to move the unit, yet entire pattern is seen actual size and color.

2. Viewer is compact (portable model available, too). Can be installed on vertical, horizontal or angular run. Web can be viewed from any angle.

3. No additional light required (unless web area is dark).

4. Three inexpensive drives available—Synchronous; Variable Speed; and Mechanical (when explosion proof electrical requirements must be met).

5. Economically priced and fully guaranteed to perform satisfactorily on *your* operation.

Send for more information.

MOUNT HOPE MACHINERY COMPANY
15 FIFTH STREET, TAUNTON, MASS.

Plants: Taunton, Charlotte and in England.
Sales Engineers in Principal Cities.
World Wide Distributors: Mount Hope Machinery S.A., Switzerland

Mount Hope Makes the Following Web Control Equipment for the Textile Industry

- Free Wheeling Expanders
- Vari-Bow Expanders
- Automatic and Push Button Bow and Skew Weft Straightening Equipment
- Non-Stop, Twist-Free Cloth Openers
- Precision Guiders
- Floating Roll Guides
- Selvage Uncurlers
- Continuous Roll Feeds
- Tension Controls
- Textometer (Moisture Control)
- Web Viewer
- Other Specialized Equipment

The following are Registered Trade Marks: Mount Hope; Bow Skew Liner; Free-Wheeling Expanders

EXTRA

The Mount Hope System is saving many textile firms hundreds and thousands of dollars.

If you would like an engineering survey designed to uncover ways and means of saving money in your cloth handling operations, contact us for details.

For further information use Handy Return Card, Page 191

Better way to make cottons water repellent

With a new durable silicone alloy treatment, processing time is reduced and simultaneous application of creaseproofing resins is possible

by S. P. Koltun[1]
Southern Regional Research Laboratory[2]

Exclusive

A NEW silicone alloy (3)[3] has been developed at the Southern Regional Research Laboratory to give excellent water repellency to cotton. It is an alloy of tetravinyl silane (TVS) and methyl hydrogen siloxane (MHS), polymerized simultaneously in the presence of benzoyl peroxide and methyl isobutyl ketone (MIBK), used as the catalyst and solvent, respectively. Advantages of the treatment are the low curing time and temperature required, no discoloration of the fabric, short processing time, and the fact that creaseproofing resins may be incorporated in the formulation.

These costs are based on the application of the TVS-MHS alloy in the form of an aqueous emulsion in hypothetical plants at annual productions of 14.4 to 60.5 million linear yards, using a processing rate of 120 yards per minute on conventional finishing equipment. Costs are reported for application of the alloy alone as well as for a triazone resin dissolved in the alloy. The latter treatment imparts crease resistance in addition to water repellency imparted by the silicone alloy.

The Process. The process for imparting water repellency and crease resistance to fabric, illustrated in *Figure 1*, includes those operations normally used for the application of resins to cotton fabric: namely, padding, drying, curing, washing, and final drying. Equipment requirements include polymer and mixing tanks, pumps, padder, enclosed tenter frame, roller curer, continuous washing range, and dry cans. If the triazone resin is not added, the washing range and dry cans can be eliminated.

TVS and MHS are simultaneously polymerized for 90 minutes at 176 F in the polymer tank, using benzoyl peroxide as the catalyst and MIBK as the solvent. The polymer is then transferred to a mixing tank where it is made into an aqueous emulsion using Ethomid[4] (ethoxylated oleamide) as the emulsifier.

Zirconyl acetate, an organo-zirconium salt, is added to the aqueous emulsion and hydrolyzes on heating to form basic zirconyl acetate, which is deposited on the fabric and catalyzes the curing of the alloy. Then creaseproofing resins and their catalysts may also be added to the emulsion. This solution is then pumped to the padder, through which the fabric is passed. Wet pick-up is maintained at 90 per cent from the padder.

The fabric is then dried for 20 seconds at 290 F, and cured for 3 minutes at 325 F. If creaseproofing resins have been added, the fabric after curing is

Continued on page 144

[1]Co-authors: K. M. Decossas, C. J. Conner, W. A. Reeves, and E. F. Pollard.
[2]One of the laboratories of the Southern Utilization Research and Development Division, Agriculture Research Service, United States Department of Agriculture; it is located at New Orleans, La.
[3]Numbers in parentheses are literature references at the end of this article.
[4]This trade name is given as part of the exact experimental conditions and not as an endorsement of the product over those of other manufacturers.

by J. W. & N. W. Masselli
and M. G. Burford
Wesleyan University[1]
Exclusive

Swap chemicals

Cotton processing and stream pollution

THE AVERAGE BOD* LOADS discharged from the finishing processes are recorded in *Table 1* (4)[2]. Note that in desizing, an average load of 6.7 pounds (based on weight of fiber) is discharged from every 100 pounds of cloth desized. In scouring (kiering), 4.7% is discharged; in bleaching, 0.5%; in mercerizing, 0.6%, and in dyeing and printing, 2.5%.

If all the cloth goes through all the processes, a total BOD load of 15.0% is produced, since these loads are additive and superimpose on each other. Under these conditions, desizing would produce 45% of the total BOD, scouring 31%, bleaching 3%, mercerizing 4%, and dyeing and printing 17%.

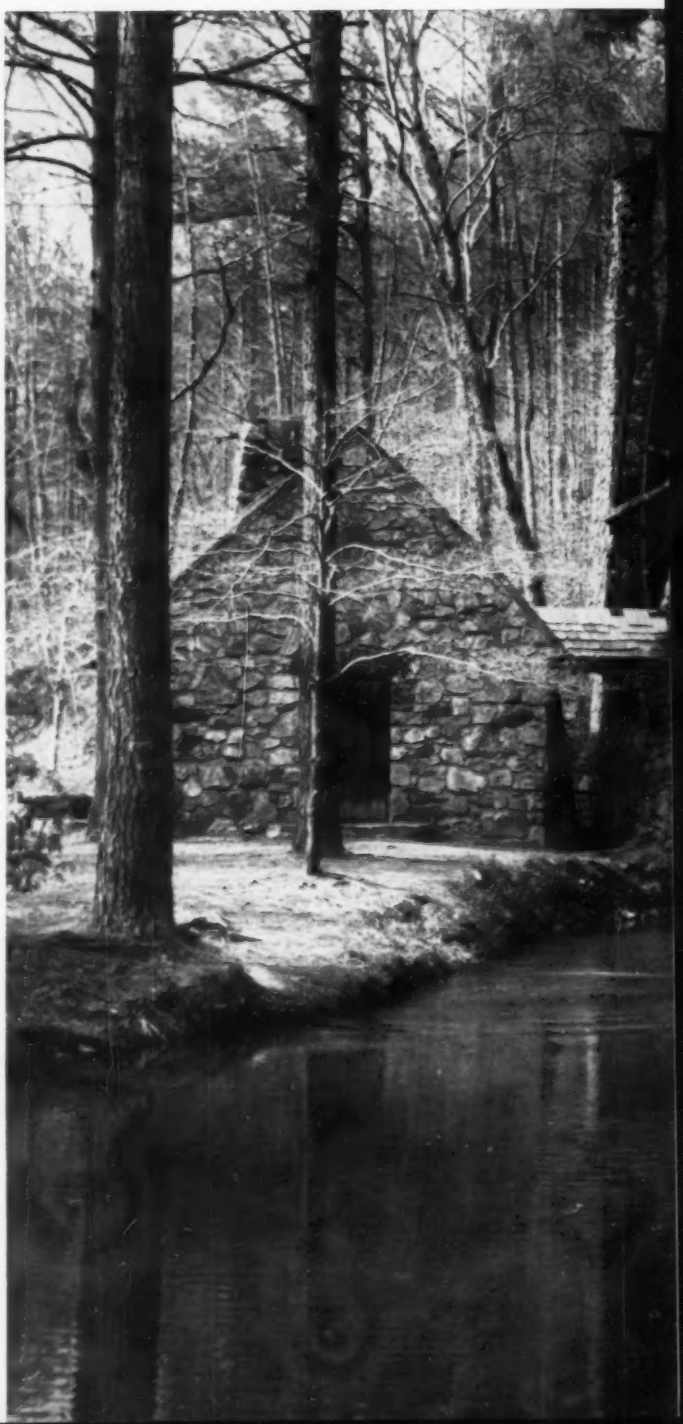
BOD sources

Often, however, some of the processes are bypassed. If white cloth is desired, for example, dyeing and printing are omitted. If the cloth is to be dyed a heavy shade, bleaching may be omitted and only a light kiering may also be used. In many instances a considerable amount of cloth is not mercerized.

The only process that all cloth must go through is desizing, since processing cannot be done properly if the slashing starch remains on the fiber. Consequently in all mills the percentage BOD contribution of the desize waste will be increased and the contribution of all other process wastes will be decreased. In several surveys conducted by this laboratory, the desize contribution averaged about 70% of the total BOD, scouring 20%, and coloring 10%.

From the knowledge obtained in the above sur-

Continued on page 122

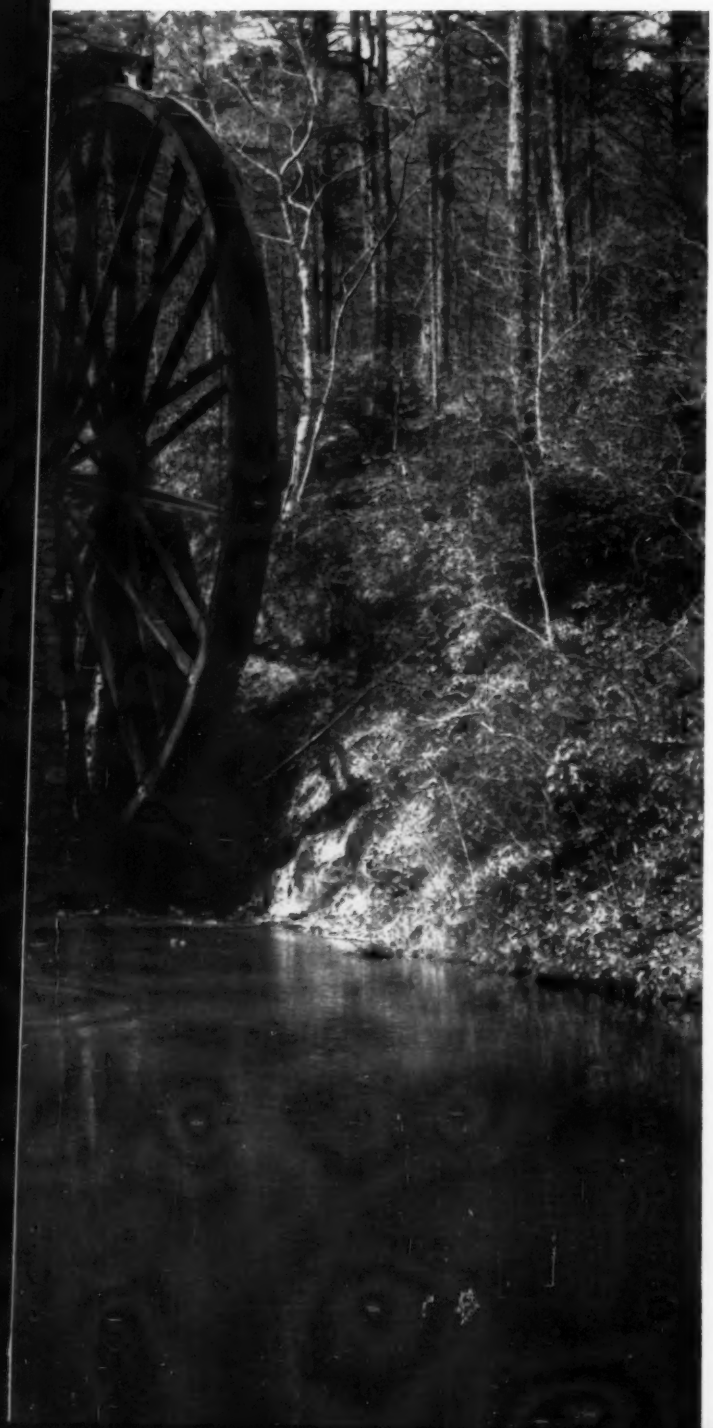


[1]The authors are members of the Industrial Waste Laboratory, Wesleyan University, Middletown, Conn. J. W. Masselli is research chemist, Mr. Burford is consultant-supervisor, and N. W. Masselli is assistant supervisor.

[2]Numbers in parentheses are literature references at the end of the articles.

***Abbreviations used in both articles:**
BOD — biochemical oxygen demand
owf — on weight of fiber (cotton and scoured and oven-dried wool)
owc — on weight of commercial chemical
mg/l — milligrams per liter

for cleaner streams



Wool processing and stream pollution

FROM A POLLUTION POINT OF VIEW only the scouring, dyeing, wash after fulling, and carbonizing are of interest, since liquid discharges are made only in these processes.

The BOD loads from the various processes used in woolen mills are recorded in *Table I.* Method I describes the processes used generally in the present and particularly in the recent past. It will be noted that scouring with soap has a very high pollution potential (25.4% owf) and produces 55.4% of the total plant BOD in a scouring and finishing mill.

Stock dyeing with acetic acid has a solution potential of 4.9% owf and produces 10.9% of the total plant BOD. Wash after fulling has a pollution potential of 15.0% owf and produces 33.3% of the total plant BOD. Neutralizing after carbonizing has a pollution potential of 0.2% owf and produces only 0.4% of the total plant BOD. In finishing plants (no scouring done), stock dyeing produces 24% of the BOD, wash after fulling 75%, and carbonizing 1%.

It is obvious that any pollution reduction plan for scouring and finishing mills must involve the scouring and wash after fulling wastes since they produce an average of 89% of the total plant BOD. In finishing mills the wash after fulling process and the stock dyeing process produce 99% of the total BOD.

In order to obtain a better picture of the actual BOD sources in the wool mill effluent, it is desirable to determine the chemical nature of the compounds discharged in the individual processes.

Chemical sources of BOD

Dirty Wool. In the scouring process the natural impurities secreted by the sheep (variously termed yolk, wool grease, wool fat, suint or lanolin) and the acquired impurities picked up on the feeding range (dirt, burrs, feces, chemical sprays, etc.) are removed.

Yolk usually designates all the secretions of animal origin adhering to the fleece and includes both the wool wax and suint. Wool wax, wool fat, and wool grease are usually considered synonymous and refer to the water-insoluble greasy material adhering to the wool.

Chemically these are essentially waxes and not

Continued on page 128

Cotton processing and stream pollution

(from page 120)

veys, the following very important conclusions have been drawn:

1. Desize wastes will produce at least 45% and as much as 94% of the total BOD. It will probably average 60 to 80% in most mills.
2. Scouring wastes will produce not more than 41% of the total BOD and generally will average 10 to 30%.
3. Bleaching wastes will average below 3% of the total BOD.
4. Mercerizing wastes will average below 4% of the total BOD.
5. Dyeing and/or printing wastes will produce 5 to 30% of the total BOD and probably will average 10%.

Generally all of these BOD loads must come from the following three sources: (1) acquired impurities; (2) natural impurities extracted from the fiber; and (3) chemicals used for processing.

Acquired. Acquired impurities may be soil and sprays picked up in the cotton fields; or dirt, rust, oil, grease, etc., picked up in the factory. Generally these impurities will cause difficulty in processing and consequently are quickly eliminated when noted. For this reason BOD loads from these sources are negligible.

Natural. Natural impurities are extracted from the fiber primarily in the hot caustic scouring (kiering and continuous scour) processes. These natural chemicals are waxes, pectins, alcohols, etc., which produce BOD loads of approximately 4% owf.

Kiering assistants (dispersing, penetrating, and emulsifying organic chemicals) are also used with caustic in this process, and these process chemicals add an additional load of approximately 1% owf to the natural BOD load discharge in the scouring wastes.

After the cloth has been scoured with hot caustic, no more natural impurities are dissolved from the fiber in subsequent processing. (A small amount of cellulose may be dissolved in mercerizing but the BOD contribution is low.)

Chemical. From these facts it may be concluded, therefore, that the BOD from natural impurities is discharged only in the hot caustic wastes and that consequently all other BOD is contributed by the process chemicals used to process the cloth. As noted previously, scouring will produce a maximum of 40% of the total BOD and will probably average 10-30%.

Consequently process chemicals will contribute 70-90% of the total plant BOD. This reinforces the interesting possibility that pollution reduction may be obtained by substituting low-BOD chemicals for the process chemicals presently being used and the remainder of this report will be devoted to an investigation of this premise.

Possible substitutions

Sizing. The major BOD source in cotton mill wastes is the starch used for slashing the fiber in the weaving mill. This starch has a BOD of 60-70% (owc), and generally is used at 10-15% add-on. In the desizing process the starch is made readily soluble by conversion to glucose through enzymic hydrolysis.

Since the commercial enzyme is used at low add-ons (0.25-1% owf) and has a low BOD (1-5% owc), its BOD contribution is low and is considered negligible.

Consequently, practically all of the BOD in the desize rinse is contributed by glucose from the slashing starch. Glucose also has a 60-70% BOD owc and hydrolysis thus does not diminish the original BOD load. Since the slashing starch contributes an average of 70% of the total plant BOD load, any pollution reduction must involve substitution for this chemical to be hopeful of any appreciable BOD

TABLE 1
BOD Contributions of Cotton Processes

Process		BOD Potential (% owf)	BOD Contribution (%)*	BOD Sources
Desizing	Average	6.7	45	Glucose from starch
Scouring				
Pressure kier, 1st boil		5.3	—	Natural waxes, pectins, alcohols, etc., 80%; penetrants and assistants, 20%
Pressure kier, 2nd boil		0.8	—	
Open kiering		0.4	—	
Continuous scour		4.2	—	
	Average	4.7	—	
Bleaching				
Cont., hypochlorite		0.8	—	Penetrants
Cont., hydrogen peroxide		0.3	—	
Open kier, hydrogen peroxide		0.4	—	
	Average	0.5	3	
Mercerizing	Average	0.6	4	Penetrants
Dyeing		0.5 to 3.2	—	Sodium sulfide, sulfite, acetic acid, etc.
Printing (Including color shop waste and wash after printing)		1.9 to 4.2	—	Starch mainly, plus glycerol, reducing agents, detergents, and soap
	Average	2.5	17	
Grand total (based on averages)		15.0	100	

*Based on grand total of averages (15% owf)

A SKILLED HAND IN CHEMISTRY...AT WORK FOR YOU

An Invitation

to dyers, printers and finishers to investigate products now available from Nopco Chemical Company and its subsidiary Jacques Wolf & Co.

PRINTING

☐ **Supergum™ H** A cold-water-soluble powder used to make a thickening paste low in solids and of high viscosity. Gives full flow for both roller and screen printing and excellent stability in both acid and alkaline media.

☐ **Superclear®** A prepared gum solution free of all impurities. Used for machine and roller printing. Imparts sharp outline and fine detail.

☐ **Hydrosulfite AWC** (for application and discharge printing) Sodium formaldehyde sulfoxylate, available in lumps, pea or rice size, as well as powder. It is used for application printing of vat colors or for discharge printing. May also be used for stripping wool, acetate and other fibers.

STRIPPING

☐ **Hydrozin®** A normal zinc formaldehyde sulfoxylate used for discharge printing on acetate grounds and for stripping wool and synthetic fibers.

VAT DYEING AND STRIPPING

☐ **Hydrosulfite of Soda Conc.** A pure, full-strength sodium hydrosulfite used as a reducing agent for dyeing vat colors and for stripping colors from any type of fabric.

SOFTENING

☐ **Nopcotex® NP-25** Outstanding napping agent for cotton and synthetics. Features: non-yellowing; stable in resin formulations; excellent fiber lubricant.

☐ **Nopcotex V** An excellent, non-yellowing cationic softener for application to cotton, wool and synthetic fabrics. Can be used with resins or as a pure finish.

☐ **Polymul® MS-40** A polyethylene-wax emulsion recommended as a pure finish and top softener to improve abrasion resistance. Facilitates the cutting and sewing operations.

☐ **Nopcotex B** A solubilized glyceryl monostearate, providing a full soft hand on cotton; offered in a powder form at 100% activity.

Please send me more information on the products checked.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

NOPCO®

NOPCO CHEMICAL COMPANY

JACQUES WOLF & CO., a subsidiary

60 Park Place, Newark, N.J.

Plants: Harrison N.J. • Carlstadt, N.J. • Richmond, Calif. • Cedartown, Ga.
London, Canada • Mexico, D.F. • Corbeil, France • Sydney, Australia

CMC
the soft warp size for good hand

This improved size prevents undesirable fabric stiffness, even when finishes are applied directly to fabrics that have not been desized. That's because warps sized with Hercules® CMC remain soft and flexible. Moreover, if man-made fibers are being woven, CMC's softness, combined with its film strength, helps improve weavability. For additional information on the properties of CMC Warp Size, and its contributions to the production of quality fabrics with a good hand, write to Hercules Powder Company today.

Cellulose and Protein Products Department

HERCULES POWDER COMPANY
INCORPORATED

Hercules Tower, 910 Market Street, Wilmington 99, Del.

VC61-4

For further information use Handy Return Card, Page 191

reduction.

Several sizes with low inherent BOD values have been suggested for use in place of starch. These include carboxymethylcellulose (3% BOD owc), hydroxyethylcellulose (3%), polyacrylic acid (1%), and polyvinyl alcohol (1%). Recently a manufacturer has been advertising a modified starch sizing which has a BOD 70% lower than starch (5) and may be used at one-half the add-on generally used. Through this substitution the desize BOD may be reduced 86% and the total plant BOD load by 50-70%.

Snyder (6) actually used carboxymethylcellulose mixed with starch (35-65 ratio, for cost reduction) in regular production.

He found that the total add-on was reduced from 13.7% owf when starch was used to 7.8% when the mixture was used. No difficulties in weaving were noted and removal of the size was more easily effected.

BOD reductions were thus obtained through lower add-ons (43% less) and through the lower BOD of the mixture (33% less). The pollution potential of the desizing process was thus reduced from 9.6% owf to 3.7% (a 61% reduction).

Carboxymethylcellulose may be used alone for sizing but its high cost (relative to starch) presently is a deterrent to such usage. When so used, it will reduce the BOD potential of the desizing process from 6 to 10% owf to less than 0.1% owf.

From these two facts it may be concluded, therefore, that *the total BOD from a cotton mill may be reduced 50-90% by the substitution of just one process chemical.*

Scouring. Scouring waste BOD, as indicated previously, is obtained primarily from the natural impurities (waxes, pectins, alcohols, etc.) extracted by the hot caustic. Since these impurities must be extracted, negligible reductions in pollution may be effected in this process.

Some mills, however, use high-BOD kiering assistants, such as pine oil (108% BOD owc), which increase the scour waste BOD by 20%. Elimination of such assistants can reduce the scour BOD by 20% but the total plant BOD cannot be reduced more than 5-10% since scouring wastes will never contribute more than 40% of the total plant BOD and usually contribute about 10-30%.

Reduction possibilities in the bleaching and mercerizing processes are negligible since these processes have low pollution potential, contributing only 3% and 4%, respectively, to the total plant BOD. It is believed that organic penetrants and detergents used in these processes contribute the major portion of this BOD. If substitution is 100% successful, the total BOD reduction will not be more than 7%.

Dyeing. In dyeing, a multitude of processes and process chemicals are usually used. The major processes used for cotton are the direct, developed direct, vat, sulfur, and naphthol AS processes. Of less importance are the basic, mordant, mineral acid, pigment, and oxidation processes.

In these processes the following general types of process chemical assistants are used: retarding, fixing, exhausting, dispersing, emulsifying, oxidizing, reducing, acidifying, developing, softening, dissolving, wetting out, penetrating, etc. Both the dye colors and the chemical assistants are generally used at 0.5-5% add-ons (owf) but add-ons as high as 60-100% may occasionally be used.

The dye colors themselves have low BOD (average 7% owc) and also stay in the cloth. Developers such as *beta*-naphthol have a high BOD (179% owc) but they couple with the dye and also remain on the fiber. Consequently these also contribute low total BOD loads.

Practically all other chemicals, however, are rinsed out of the cloth and discharged to waste. If their BOD's are high (25-200%) and they are used at even moderate add-ons (1-3%), they will contribute a major portion of the dyeing process BOD load. If the process is used on a major proportion of the cloth finished by the mill, the chemicals contribute an appreciable proportion of the total plant BOD load.

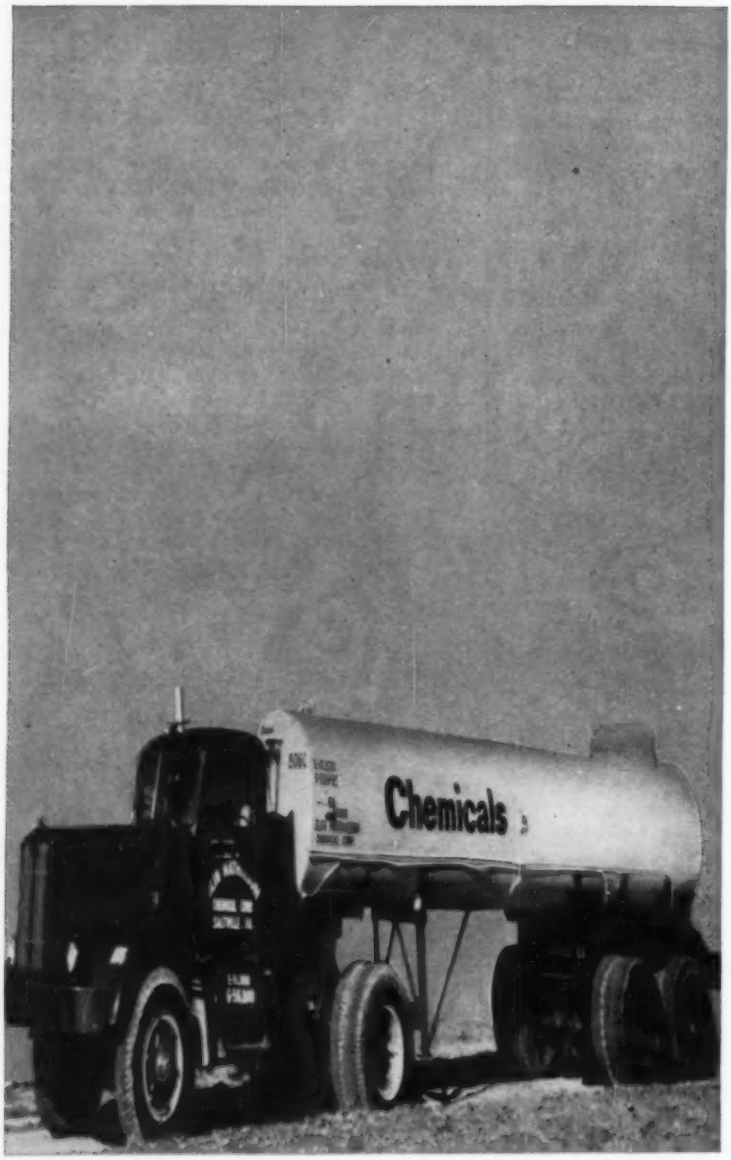
Although surveys indicate that dyeing processes are expected to produce only 10 to 30% of the total plant BOD, it must be remembered that circumstances may be found which may considerably increase this proportion. For example, preliminary and final washing with soap (140% BOD owc) at 1% owf will add 2.8% BOD owf to the dyeing process. If all of the cloth goes through this process, *the soap wash alone will contribute almost 19% of the total plant BOD.*

About the Study

■ THE AUTHORS prepared these two companion articles as a follow-up to some previous reports (1, 2, 3, 4) to the New England Interstate Water Pollution Control Commission, reports that indicated stream pollution from textile mills could be reduced by a judicious use of low-BOD chemicals. Funds from the Federal Water Pollution Control Act aided in the studies on cotton mill wastes.

Working in the Industrial Waste Laboratory of Wesleyan University, Middletown, Conn., and confining their studies to biochemical oxygen demand (the most important pollution indicator) of woolen and cotton mill wastes, they crystallized earlier findings—certain chemicals saddle our streams with needless BOD load—and came up with these programs.

Unfortunately, starch remains the single greatest source of BOD, and there are no ready substitutes. True, Dan River Mills, Inc., is using CMC as warp sizing, but Dan River adopted it rather than build a waste disposal plant. See TI for October 1960, page 161. Chemical progress and state laws probably will take care of that bit of pollution. In the meantime, and in the light of that probability, these two studies grow taller as timely nuclei.—The Editors



Mathieson SQUEEZES your caustic delivery costs

How? Many ways. For example, in most areas, you can order 73% Mathieson caustic soda by truck. The benefits to you are obvious. This concentrated solution means fewer deliveries, less shipping weight, less transportation cost. And only Olin Mathieson offers you this convenient truck delivery.

More ways Mathieson squeezes delivery costs? Location. Mathieson has eight producing plants and shipping points (with a ninth under construction) covering the industrial South and East, with barge, rail or truck shipments to suit your needs.

Convenient truck scheduling: we time deliveries when you need them. Service: as you have a right to expect, it's part of company policy, backing every Mathieson chemical with technical assistance. For full details, write OLIN MATHIESON, Baltimore 3, Maryland.

Ammonia • Carbon Dioxide • Caustic Soda • Chlorine • Hydrazine and Derivatives • Hypochlorite Products • Methanol • Muriatic Acid • Nitric Acid • Soda Ash • Sodium Bicarbonate • Sodium Chlorate • Sodium Chlorite Products • Sodium Methylate • Sodium Nitrate • Sulfur (Processed) • Sulfuric Acid • Urea

8947

CHEMICALS DIVISION **Olin**

For further information use Handy Return Card, Page 191

If detergent (0-3% BOD owc) is used in place of soap, the washing process contribution will be negligible.

The best way to determine if pollution reduction is possible in the dyeing process is to obtain an inventory list of the amount of chemicals used in these various processes. The BOD values of many of the process chemicals are listed in the literature (4,8) and may be used to calculate the pounds of BOD contributed.

From these, the total contribution of the dyeing processes may be roughly calculated. If it is not appreciable (above 10%), reduction possibilities will be limited. If appreciable, several substitutions may be made for reduction.

As indicated, soap may be an important contributor and may be replaced by low-BOD detergents. Acetic acid (35% BOD for 56% acid, 52% BOD for 80% acid) is often used at 2% owf as an acidifying agent. It may readily be replaced by *ammonium sulfate, ammonium chloride, sulfuric acid* or other inorganic acidic compounds, all of which exert no BOD.

Snyder (6) indicated that this acid produced 22% of the total plant BOD in his mill, a very high proportion indeed. In the surveys conducted by this laboratory acetic acid produced 3-6% of the total plant BOD load. Quite often this acid is used with potassium bichromate as an oxidizing bath for vat dyes. This may be replaced by *air oxidation* in steam chests or by *sodium peroxide*, all of which contribute no BOD.

Sodium acetate (32% BOD) is often used as a dissolving or buffering compound. It may in some instances be replaced by *sodium bicarbonate* or other inorganic buffer of 0% BOD.

Many of the older emulsifying and penetrating oils were composed of natural compounds and had high BOD values (pine oil, 108%; sulfonated castor oil, 52%; sulfonated vegetable oil, 59%; sulfonated coconut oil, 96%). These may be replaced by *ethylene ether* condensation products and other new compounds, many of which have 0-10% BOD.

Reducing agents such as sodium sulfite (22% BOD), sodium hydrosulfite (22%), sodium sulfide (40%), are widely used to dissolve vat and sulfur dyes. No other practical replacements for these are known and they must be tolerated.

The sulfides and sulfites, however, are readily oxidized by air and oxidizing agents (chlorine, peroxide, chromate, perborates, etc.) and their full BOD or chemical oxygen demand potential is not exerted in the effluent. Glucose is also used as a reducing agent in these processes but its high BOD (71%) precludes its suggestion as a replacement.

Occasionally ethyl alcohol (125% BOD) may be used to dissolve a dye color. Other dissolving agents of low BOD should be looked for.

In dyeing, therefore, *soap, acetic acid, sodium acetate, sodium sulfide, sodium hydrosulfite, sodium sulfite, glucose,* and *emulsifying oils* are major contributors and should be replaced by the suggested substitutes. The total plant BOD may be reduced by 5-25% depending on the amount of cloth dyed and the process chemicals used.

Printing. In printing, the process chemical pollution sources are the thickeners, hygroscopic agents, dyeing assistants and reducing agents used to prepare the printing pastes, and the oxidizing and deterging agents used to wash the cloth after it has been printed.

The liquid wastes are discharged in the color shop in cleaning the tanks and drums used to prepare and transport the paste, in the printing room when the rolls and color boxes are washed down, and in the wash room when the cloth is oxidized and washed.

For thickening, wheat starch (55% BOD) is commonly used, usually in concentrations of 5-20% in the paste. British gum (dextrinized cornstarch, 61% BOD) is also generally used, often at much higher concentrations (20-40%). Vegetable gums such as gum tragacanth (2% BOD), locust bean gum, gum arabic, and gum senegal may also be used. Newer thickening agents, developed recently by the process chemical industry, are *carboxymethylcellulose* (3% BOD), *hydroxyethylcellulose* (3% BOD), resins, and other cellulose *ethers* and *esters*.

Lubricants generally used are cottonseed oil (estimated 60% BOD) and glycerine (64% BOD). *Diethylene glycol* (4% BOD) should be used as a replacement.

Reducing compounds generally used are sodium bisulfite (22% BOD), sodium hydrosulfite (22% BOD), sulfoxite (27% BOD), and glucose (71% BOD). Sodium dichromate (0% BOD) is usually used for oxidizing, generally with acetic acid as the acidifying agent. The dichromate may be replaced by *peroxides, perborate,* etc., and the acetic acid may be replaced by *sulfuric acid, ammonium chloride, ammonium sulfate* or other inorganic acidic buffers. These substitutes all have 0% BOD.

Soap (140% BOD) has been used in the past for washing after printing but it has been largely displaced by synthetic detergents of low BOD (0-10%). Each time a 1% owf soap is used a 1.4% BOD load (owf) is added to the total plant load.

The print pastes have very high BOD values (50,000 to 250,000 milligrams per liter) because of the high concentration of high BOD chemicals used. Each gallon discharged to waste will measurably increase the BOD of the plant effluent.

Emulsion printing pastes have been recently developed (7) and are being widely accepted. These use lower concentrations of the usual thickeners with sodium lignin sulfonate (10% BOD) as an emulsifier and mineral spirits (16% BOD) as a thinner.

The BOD's of the emulsion print pastes are 35% lower than corresponding starch-gum pastes. In addition, the mineral spirits which contribute 35% of this BOD are evaporated off and are not discharged in the liquid wastes. A total BOD reduction of 65% may be obtained by substituting the *emulsion pastes.*

Summary and Conclusions. The data included in this report indicate that pollution reduction through substitution of low-BOD process chemicals is feasible and practical. The most important

chemical which must be replaced is the high-BOD starch used for slashing.

Through the substitution for this chemical alone, BOD loads from cotton mills may be reduced by 50-90%. Unfortunately, this is the most difficult chemical to replace, since the finishing mill, which removes and discharges this chemical to waste, generally has nothing to do with the weaving of the cloth and usually receives cloth from many different sources.

Consequently the textile industry must urge the weaving mills where the slashing starch is actually put on the cloth to make this replacement. Practically all other process chemicals, however, are directly under the control of the finishing mills and these may be readily replaced when pollution reduction is desired.

Among the important BOD sources which should be replaced are soap, acetic acid, pine oil, glycerine, glucose, sodium acetate, cottonseed oil, sulfonated castor oil, sulfonated vegetable oil, sulfonated cocoanut oil, etc.

It has been shown that replacement of the slashing starch is a necessity if substantial BOD reduction is hoped for, since this produces an average of 70% of the total plant BOD. Conversely, replacement of other process chemical sources should not produce over 30% reduction, on the average. If both the slashing starch and other high-BOD sources are replaced, BOD reductions of 50-95% may be obtained. Such reductions in many instances may obviate the necessity of building waste treatment plants and will save the industry many millions of dollars in the future when pollution abatement will be more vigorously prosecuted by state and federal agencies.

Other substitutions beyond these listed may be possible, particularly to those cognizant of textile processing methods. The textile industry very badly needs a summary of the BOD's of all available process chemicals and a review of all of the possible processing methods.

The BOD list may be obtained by urging process chemical manufacturers to include BOD analyses as part of the information included with the data on their chemicals. With the BOD values and the amount (% owf) used, the BOD contributions of all processes may be readily calculated and the lesser processes could be readily indicated.

The processing methods which have low BOD's should be compiled and sent to every cotton mill and pollution abatement agency in the nation. On the basis of experience now available, little or no difficulty is expected in the substitution of the chemicals listed in this report. The changes may be quickly made and positive control of pollution loads may be easily effected. There is no reason why textile mills should not make most of the changes immediately and help reduce the pollution of the nation's streams.

References

1. Burford, M. G., Masselli, J. W., Snow, W. J., Campbell, H., and DeLuise, F. J., "Industrial Waste Surveys of Two New England Cotton Finishing Mills." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts (1953).
2. Masselli, J. W., and Burford, M. G., "Pollution Sources in Wool Scouring and Finishing Mills and Their Reduction Through Process and Process Chemical Changes." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, June, 1954.
3. Masselli, J. W., and Burford, M. G., "Pollution Sources from Finishing of Synthetic Fibers." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, June, 1956.
4. Masselli, J. W., Masselli, N. W., and Burford, M. G., "A Simplification of Textile Waste Survey and Treatment." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, July, 1959.
5. *Chemical and Engineering News*, October 10, 1960, p. 56.
6. Snyder, D., "Cotton Slashing with Synthetic Compounds as a Means Toward Pollution Abatement." Crompton - Shenandoah Company, Waynesboro, Virginia.
7. Greene, R. D., "Printing with Emulsions." *American Dyestuff Reporter* 47: 191-3 (1958).
8. Stafford, W., and Northup, H. J., "The BOD of Textile Chemicals." *American Dyestuff Reporter*, p. 355 (May 23, 1955).

Wool processing and stream pollution *(from page 121)*

fats or greases. Lanolin is purified wool wax and has been found to be a complex mixture of organic compounds known as steroid esters. Cholesterol is an important part of the lanolin. Suint properly refers to the water-soluble fraction of the yolk and is largely composed of potassium soaps (2).

The raw wool (also known as grease wool) used in most mills in the United States averages 60% yolk and acquired impurities and 40% fiber.

Since only the fiber is desired, the yolk and other impurities are removed during scouring and discharged to waste. Consequently for every pound of scoured wool produced, *one and one-half pounds of wool wax, suint, and dirt are so discharged*

Laboratory and plant scouring analyses indicated that BOD loads equal to 22.8% owf of the scoured wool (dried basis) were produced by the natural and acquired impurities. Further experiments with the same wools freed of wool wax by ether extraction showed that the suint salts produced 11.6% owf or 51% of this BOD.

Scoured wool still contains 1-2% soap and wax and consequently this may be extracted in subsequent processes. BOD loads of 1-2% owf are expected from this source. When detergent is used, the wool is expected to contain less soap and wax and the BOD loads are lower (0.2-1% owf).

Suint (potassium soaps) and wool wax (steroids, lanolin, cholesterol, etc.) are therefore important BOD producers in all wool scouring and finishing mills. Commercial soap (140% BOD owc) has been used extensively in the past as a scouring aid at 1-2% owf, and its BOD contribution is superimposed on the natural BOD extracted from the fiber.

Generally the soap produced an average of 10% of the scour waste BOD or approximately 5% of the total plant BOD (scour-finish mill). Sodium carbonate (0% BOD) is usually used as the alkalizing agent in this method.

Stock Dyeing. In stock dyeing,

Continued on page 132

Carbanthrene® Scarlet RBB paste

Vat Red... with a bright new flair for fashion!

New from National Aniline! And timed to provide a bright, clear base for the cycle of pink shades that are currently coming into vogue.

Carbanthrene Scarlet RBB Paste is one of our controlled fine-particle vat dyes recommended for all types of dyeing, but especially for the clean results achieved in all pigment impregnation methods. It is practically unaffected by metals in the dyebath.

This new vat dye combines good resistance to light with very good-to-excellent wet fastness and is particularly suitable for crease-resistant dress goods and suitings.

Write for samples and Bulletin No. 449

American Designer Series

Hannah Troy

. . . designed this two-piece dress in rayon crepe, calls the shade Shrimp. It's typical of currently popular pinks that get their good start with Carbanthrene Scarlet RBB Paste.

NATIONAL ANILINE DIVISION

40 RECTOR STREET, NEW YORK 6, N. Y.

Atlanta Boston Charlotte Chicago Dallas Greensboro
Los Angeles Philadelphia Portland, Ore. Providence San Francisco

In Canada: ALLIED CHEMICAL CANADA, LTD.,
1450 City Councillors St., Montreal 2 100 North Queen St., Toronto 18

Distributors throughout the world. For information:
ALLIED CHEMICAL INTERNATIONAL • 40 Rector St., New York 6, N. Y.

Allied Chemical

FREE BOOKLETS

8-1 PROCESSING TEXTURED YARNS—Brochure describes the "FTF" machine for processing thermoplastic type yarns continuously to produce textured yarns. Whitin Machine Works, Whitinsville, Massachusetts.

8-2 TOOLS FOR "AVISTRAP"—New tools, sealers and accessories available for use with Avistrap cord strapping are described in illustrated brochure. American Viscose Corporation, Industrial Packaging Department, 1617 Pennsylvania Boulevard, Philadelphia 3, Pennsylvania.

8-3 MECHANICAL HANDLING EQUIPMENT—Brochure shows typical examples of actual production problems solved by special mechanical handling equipment. Elwell-Parker Electric Company, 4205 St. Clair Avenue, Cleveland 3, Ohio.

8-4 CUSHION COUPLINGS—Booklet describes line of Para-flex flexible cushion couplings that absorb vibration and compensate for shaft misalignment. Bulletin 9013, Dodge Manufacturing Corporation, Mishawaka, Indiana.

8-5 PRESSURE-TREATED LUMBER—Brochure describes performance and economy of "Wolmanized" pressure-treated lumber in the textile industry. Wolman Preservative Department, Koppers Co., Inc., 750 Koppers Building, Pittsburgh 19, Pennsylvania.

8-6 AIR COMPRESSORS—Booklet describes more than 200 models—electric and gasoline driven—of the Lincoln line of air compressors. Lincoln Engineering Company, 4010 Goodfellow Boulevard, St. Louis 20, Missouri.

8-7 MATERIALS HANDLING EQUIPMENT—Booklet describes materials handling equipment, metal parts, and textile filling boxes. Burdette Manufacturing Company, P. O. Box 8, Roebuck, S. C.

8-8 HUNT LET-OFF—Brochure tells why the Hunt Let-Off, through a system of leverage and linkage, provides a simple, smoothly operating positive warp let-off motion. Southern Machinery Co., Box 3217, Station A, Greenville, South Carolina.

8-9 FLOOR CARE—Booklet describes scrubbing, waxing, polishing and mopping equipment, as well as waxes, sealers and cleansers. Finnell System, Inc., 1300 East Street, Elkhart, Indiana.

8-10 LEAKPROOF PUMPS—Bulletin describes complete line of seal-less leakproof pumps, covering design, operation and selection of canned pumps. Chempump Division, Fostoria Corporation, Huntingdon Valley, Pennsylvania.

8-11 PACKAGE BOILERS—Catalog shows the design and construction of the Keystone 2-drum water tube package boiler for oil or gas firing. Catalog SB63, Erie City Iron Works, Erie, Pa.

8-12 SHUTDOWN MASTER PLANNER—Wall chart facilitates scheduling of equipment shutdown maintenance activities. Shows all items at a glance. Request wall chart SM-5732, Westinghouse Electric Corporation, P. O. Box 2099, Pittsburgh 30, Pa.

8-13 CONTROL WIDTH AUTOMATICALLY—Bulletin describes application of Mount Hope "Webmasters" and "Vari-Bow" expanders to control width automatically and eliminate damaged selvages. Mount Hope Machinery Company, 15 Fifth Street, Taunton, Mass.

8-14 LEASE AND RENTAL—Booklet describes lease and rental finance plans for buyers and users of industrial lift trucks. Automatic Transportation Company, 149 West 87th Street, Chicago 20, Illinois.

8-15 CENTRALIZED LUBRICATION—Catalog illustrates and describes complete line of centralized lubrication equipment, including accessories. Lincoln Engineering Company, Industrial Sales Division, 4010 Goodfellow Boulevard, St. Louis 20, Missouri.

8-16 INFRARED EQUIPMENT—Brochure describes new techniques, using fluid cooling, which make possible very compact quartz lamp ovens and furnaces. Fostoria Corporation, Department 102, 12 North Main Street, Fostoria, Ohio.

8-17 AIR REDUCTION PRODUCTS—Bulletin gives information on large group of products, ranging from calcium carbide and pipeline acetylene to organic compounds and special-purpose resins. Air Reduction Chemical and Carbide Company, 150 East 42nd Street, New York 17, New York.

8-18 PILLOW BLOCKS—Complete line of self-aligning, ball bearing pillow blocks in 31 shaft diameters is described in folder. Link-Belt Company, Department PR, Prudential Plaza, Chicago 1, Illinois.

8-19 DOCTOR BLADES—Booklet describes dependable new source of supply for high quality doctor blades. John W. Bolton & Sons, Inc., Machine Knife Division, Lawrence, Massachusetts.

8-20 BRUSHING TOOLS—Book explains the advantages of quality brushing tools and shows a number of typical successful applications. M. W. Jenkins' Sons, Inc., P. O. Box 68, Department 19, Cedar Grove, Essex County, New Jersey.

BOOKLET ITEMS CONTINUED ON PAGE 176

KNITWEAR FASHIONS

GDC DYES FOR ACRYLICS

tailored to fit the requirements of fiber, fabric, and wearer

Free-knit or full-fashioned, shaggy or smooth, cardigan or pullover, sports or dress wear—sweaters at their colorful best are dyed with GDC dyes.

Acrilan,[1] Creslan,[2] Orlon,[3] Zefran[4]—whatever your acrylic fiber—there is a range of GDC dyes that are just right for creating fashion shades with eye appeal and highest fastness to light, washing, perspiration, and drycleaning. Genacryl,® Celliton,® Supralan,® Palatine®—remember these names for acrylic-fiber dyeing, for good fiber affinity in a broad range of bright, well-penetrated, level and economical fashion shades dyed by simple methods. For acrylic sweater fashions in color—ask GDC.

Acrylic fiber of: (1) Chemstrand Corporation, (2) American Cyanamid Company, (3) E. I. du Pont de Nemours & Co. (Inc.), (4) Dow Chemical Company.
For complete information, call our Technical Service Department nearest you or write to:

gdc gaf

FROM RESEARCH TO REALITY

GENERAL DYESTUFF COMPANY

A DIVISION OF

GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET • NEW YORK 14, NEW YORK

CHARLOTTE • CHATTANOOGA • CHICAGO • LOS ANGELES • NEW YORK • PHILADELPHIA • PORTLAND, ORE. • PROVIDENCE • SAN FRANCISCO

IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

dyes, dispersing and leveling agents, fixing agents, and acidifying and alkalizing agents are used. The dye colors themselves have low BOD (average 7%) and are left on the fiber. Consequently their BOD contribution is low.

Dispersing and leveling agents may have high BOD's (25-150%) and are generally used at 1-3% owf. A 100% BOD chemical used at 3% owf would contribute a 3% owf BOD load.

Fixing agents are generally chrome or chrome mordant (0% BOD) and contribute no BOD loads. Acetic acid (35% BOD for 56% acid) is generally used at 2-15% owf as the acidifying agent and thus can produce BOD loads of 0.7-5.3% owf.

The higher add-ons are usually used in dyeing for blacks. Sulfuric acid and ammonia (0% BOD) are generally used for final pH adjustment, often at 1-2% owf add-ons, and contribute no BOD. Acetic acid is usually the major BOD source in stock dyeing when it is used in the formula.

Carding, Fulling. It must be noted that the wash-after-fulling wastes contain the oil used for carding, the soap, alkali, and sequestrant used for fulling, and the additional soap, alkali, and sequestrant used for final washing. Carding oils are used generally at 2-10% owf.

Fulling soap is generally used at 5-15% and washing soap at 1-3%. Consequently the process chemical load discharge in this waste amounts to 7-30% of the weight of the cloth.

Many carding oils have BOD's near 100%. Oils used extensively in the recent past include lard oil, olive oil, peanut oil, sulfonate red oil, neat's-foot oil, coconut oil, and soybean oil. Emulsified mineral oil and polyalkalene glycols are newer additions to this list.

Soap has an extremely high BOD (140% owc) and consequently is an important BOD contributor. Since the add-ons and BOD's of both the oil and soap are high, the pollution potential in the wash after fulling wastes is high (5-35% owf). In most mills it is expected to average about 10-20% owf.

Once the wool has been washed after fulling, it contains very little extractable matter and in subsequent processing the cloth will contribute negligible BOD.

In carbonizing, 5-6% owf sulfuric acid is used to destroy the vegetable matter in the wool. The bulk of the acid is rinsed off and the remaining traces are neutralized with sodium carbonate. Since these have no BOD and since the wool has been scoured and washed previously, low BOD loads are discharged (0.2% owf average).

In piece dyeing, essentially the same chemicals as used in stock dyeing will be used and approximately the same BOD loads will be discharged.

It may be concluded, therefore, that the BOD sources in wool scouring and finishing mills are the natural impurities (lanolin, wax, suint, etc.) extracted from the wool fiber, acetic acid and dispersing-leveling agents used in dyeing, oil used for carding, and soap used for fulling and washing. These compounds produce BOD loads of 45% owf based on the scoured wool weight, an extremely high pollution potential indeed. The natural impurities produce 55% of this load and process chemicals produce 45%.

Many mills are strictly finishing mills (do no scouring of raw wool). In these mills the natural impurities' load would be eliminated and BOD loads of 20% owf would be produced (based on scoured wool weight). All of this would be produced by the acetic acid, dispersing-leveling agents, carding oil, and soap. Soap would contribute a major proportion (50-80%) of this BOD.

Possible substitutions

Scouring. Since the natural impurities must be removed from the fiber, no substitution possibilities exist for them. Since these produce approximately 50% of the BOD in wool scouring and finishing mills, the maximum reduction possible through process chemical changes in such mills will be 50%.

However, there is no reason why scour wastes should be dumped into a stream, particularly since they may be recovered and sold. The wax fraction (lanolin) has been recovered by extraction with solvents (naphtha, gasoline, ether, benzene, carbon tetrachloride, etc.) and sold in many grades of purification.

It must be noted, however, that this fraction accounts for only half of the natural impurities' BOD and consequently the total BOD will be reduced by only 25% when such recovery is made. Recently a double solvent method using *methyl* and *isopropyl alcohols* for recovery of both grease and suint has been described and this method could reduce the total BOD by 50% if successful (5).

The soap used in soap-alkali scouring has a very high BOD (140% owc) and averages 10% of the scour waste BOD. Its substitution by a 0% BOD detergent would reduce the total plant BOD by 5%. Recently neutral scouring with *nonionic synthetic detergents* in 1000 mg/l sodium sulfate (or chloride) at higher temperatures (150 vs. 120 F) has rapidly supplanted the older soap-alkali method.

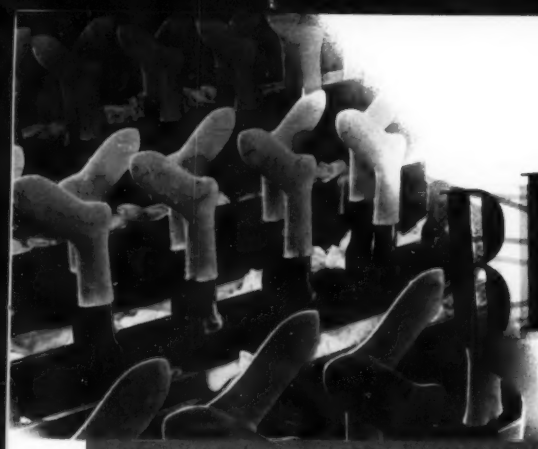
Finishing. The acetic acid used in dyeing may be readily replaced by *ammonium sulfate*. This substitution in one mill reduced the average BOD of the stock dye wastes from 2200 mg/l to 380 mg/l (83% reduction). Since the dye process produces only 11% of the BOD in wool scouring and finishing plants, the total plant BOD would be reduced 9%. In finishing mills, the plant BOD would be reduced by 20%.

As indicated previously, carding oils may have BOD's of 100% owc and are usually used at 2-1% add-ons. With such add-ons, BOD loads of 2-10% owf may be contributed by the carding oil itself.

Emulsified mineral oil (20% BOD) and *polyalkylene glycols* (4% BOD) may be used to reduce the BOD loads to 0.8 to 2% BOD owf (60-80% reduction). These substitutes can reduce the total plant BOD by 10-15% in scouring and finishing mills and 20-30% in finishing mills.

Soap (140% BOD), generally used for fulling at 5-15% owf, can produce very high BOD loads (7-21% owf). *Synthetic detergents* (12% BOD amine condensate) have been used on a production

Continued on page 137



BECCO ECHO

PUBLISHED BY BECCO CHEMICAL DIVISION Food Machinery and Chemical Corporation, New York 17, N.Y.

Best Foot Forward

Socks are worn in all sizes, shapes, colors and lengths. Sometimes they are even worn inside out, but no matter which way, you want to put your best foot forward.

The Adler Hosiery Company, a division of Burlington Mills in Cincinnati, relies on Becco's Hydrogen Peroxide to assure that they always have *their* best foot forward in the production of wool socks. You, the customer, can expect the finest in workmanship, thanks to this combination of Adler's excellent production methods and Becco's experience in the techniques of bleaching.

Adler enjoys the reputation of producing superior white wool athletic socks that are worn in high schools and colleges, and on athletic fields throughout the country, as well as bright stockings of varied colors. Becco's Hydrogen Peroxide is used in the bleaching department, one of the major areas of the Adler plant.

Becco's 35% Hydrogen Peroxide is used in a bleach developed for Adler quite a few years ago. Used with tetrasodium pyrophosphate, the peroxide provides active bleaching and detergency. What's more, inspection under Adler's strict quality-control program proves that this Becco bleaching technique has protected the wool to the fullest.

The dye room too, depends on Becco's Hydrogen Peroxide, but as a cleansing agent rather than a bleach. The peroxide thoroughly removes all traces of previously-used dyes from the stainless steel equipment, eliminates contaminants, and assures bright, pure colors from the fresh dyes.

And that is only part of the Becco story. Becco has cooperated fully with Adler, and with other companies, in developing a tank storage and pressure distribution system for its Hydrogen Peroxide. This system saves considerable money, since it eliminates waste and handling of small containers. Adler has been pleased with Becco's technical service, and we know you will be, too. Write or call and let's see if we can help you. Address: Dept. ADR-61-8.

BECCO ECHO

No Fish Story Here!

MEN are natural exaggerators when they describe the results of their fishing trips. Let them catch a minnow, and they bring home a whale! Becco, on the other hand, bends over backwards to assure *accuracy* in the delivery of specified quantities of hydrogen peroxide to its customers.

Thoroughly cleaned and carefully inspected aluminum drums are placed singly on Howe or Toledo scales; the reading is set at zero. The drums are filled with filtered hydrogen peroxide until the scale shows the labelled shipping weight. Carboys are handled similarly. These scales are inspected monthly by representatives of the scale company to maintain accuracy.

At our Buffalo plant, a Howe Track Scale and Type Registering Weighbeam is used for weighing tank cars and tank trucks. In the case of a tank car, the vehicle is placed on the scale, weighed, and a record is made of the tare weight. Filtered hydrogen peroxide is pumped into the car until it is filled to the base of the dome. It is then inspected, since the load, if not filled to the exact height, can cause the car to oscillate dangerously when it is in motion. The car is sealed and weighed. The difference between the two readings is the weight of hydrogen peroxide in the tank car. Finally, Becco's accounting department and the railroad receive copies of the printed records. The scales used are inspected and tested four times a year, and no inaccuracies have ever been reported.

The weighing of tank trucks is handled with similar care to ensure accurate delivery, and a weight certificate is furnished to each customer.

So, the fishermen have their stories, and we have ours—and ne'er the twain shall meet!

MORE than a third of a century of experience shows! Ever since it was founded 36 years ago, Becco has devoted its time and energy to the manufacture of hydrogen peroxide and to research in its application. Today, Becco provides industry with 10 additional peroxygen chemicals based on electrolytically-produced hydrogen peroxide.

Becco serves many industries—textile, paper, plasticizers, cosmetics, metal finishing, and is even doing its share in the fields of missile guidance and propulsion. The broadened use of peroxygen chemicals owes much of its present state to Becco's Research and Development staff which continuously studies customers' needs in an effort to keep pace with today's—and tomorrow's—world.

The technical "know-how" of our chemists, engineers, and technical fieldmen is available to you. Their experience has been condensed in a series of technical bulletins. A few are listed at right. If you find any of interest, just drop us a line on your letterhead and ask for the ones you want by number. We'll be happy to oblige.

AVAILABLE TECHNICAL BULLETINS

Product Descriptions

1. ACTIVE OXYGEN CHEMICALS
2. HYDROGEN PEROXIDE
3. HIGHLY CONCENTRATED H_2O_2
4. PERACETIC ACID 40%
6. SODIUM CARBONATE PEROXIDE
7. ALKALINE EARTH METAL PEROXIDES
8. SODIUM PYROPHOSPHATE PEROXIDE
10. UREA PEROXIDE
11. POTASSIUM PERSULFATE
41. BECCO H_2O_2 35% HP
42. BECCO H_2O_2 35% FORMULA D
45. SODIUM PERBORATE
46. CONCENTRATED H_2O_2
49. AMMONIUM PERSULFATE
70. BECCO HYDROGEN PEROXIDE 98%

Properties, Reactions, etc.

24. ANALYSIS OF ALIPHATIC PERACIDS
34. USES OF PERSULFATES A BIBLIOGRAPHY—PART I
40. EQUIPMENT FOR USE WITH HIGH-STRENGTH HYDROGEN PEROXIDE
55. STABILITY OF PURE HYDROGEN PEROXIDE
59. THE ANALYSIS OF H_2O_2 SOLUTIONS
62. HYDROGEN PEROXIDE VAPOR
68. USES OF PERSULFATES A BIBLIOGRAPHY—PART II
87. THE BEHAVIOR OF THE GLASS ELECTRODE IN HYDROGEN PEROXIDE SOLUTIONS
93. ANHYDROUS HYDROGEN PEROXIDE AS A PROPELLANT

BECCO Hydrogen Peroxide

Putting Ideas to Work

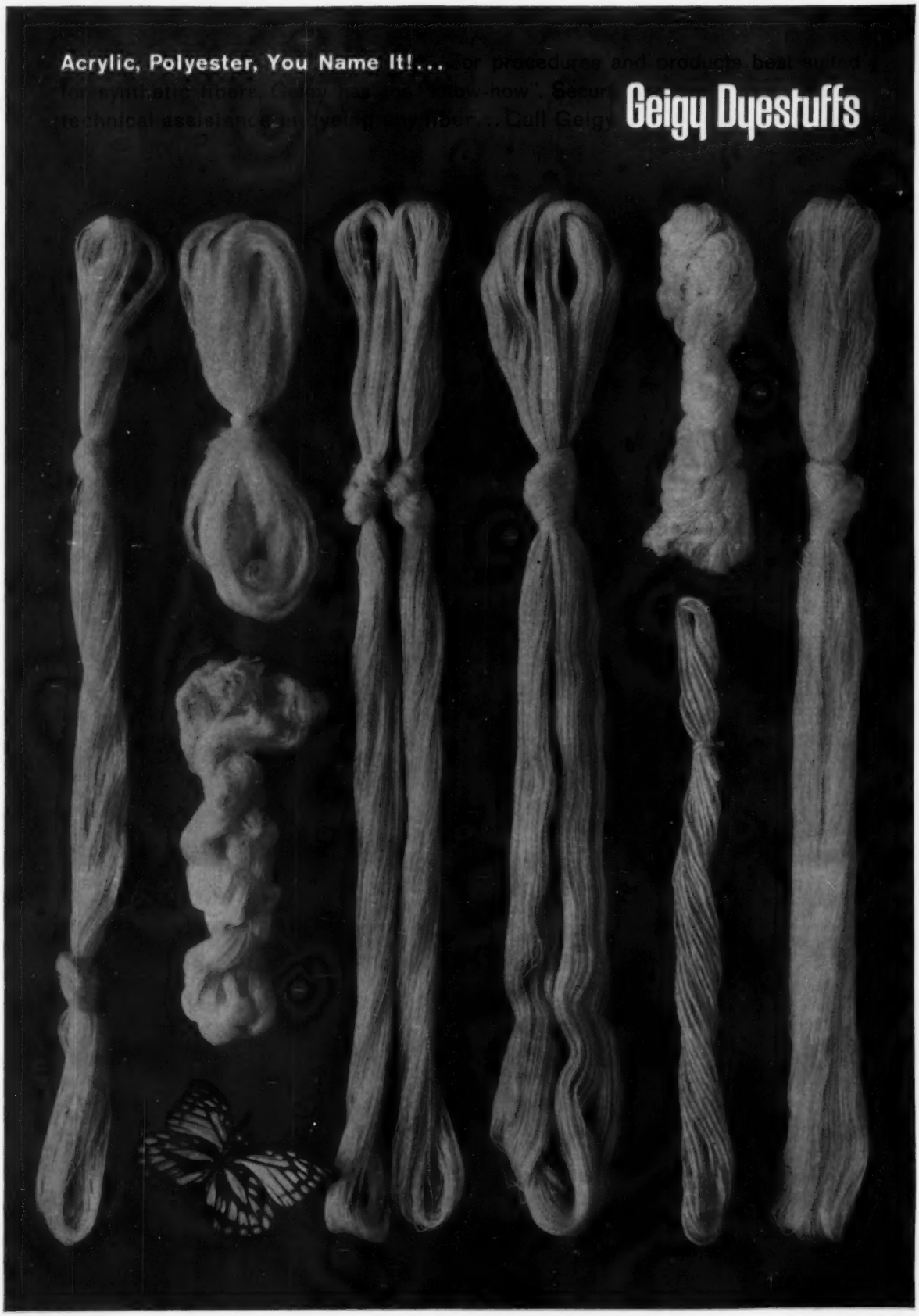
FOOD MACHINERY AND CHEMICAL CORPORATION

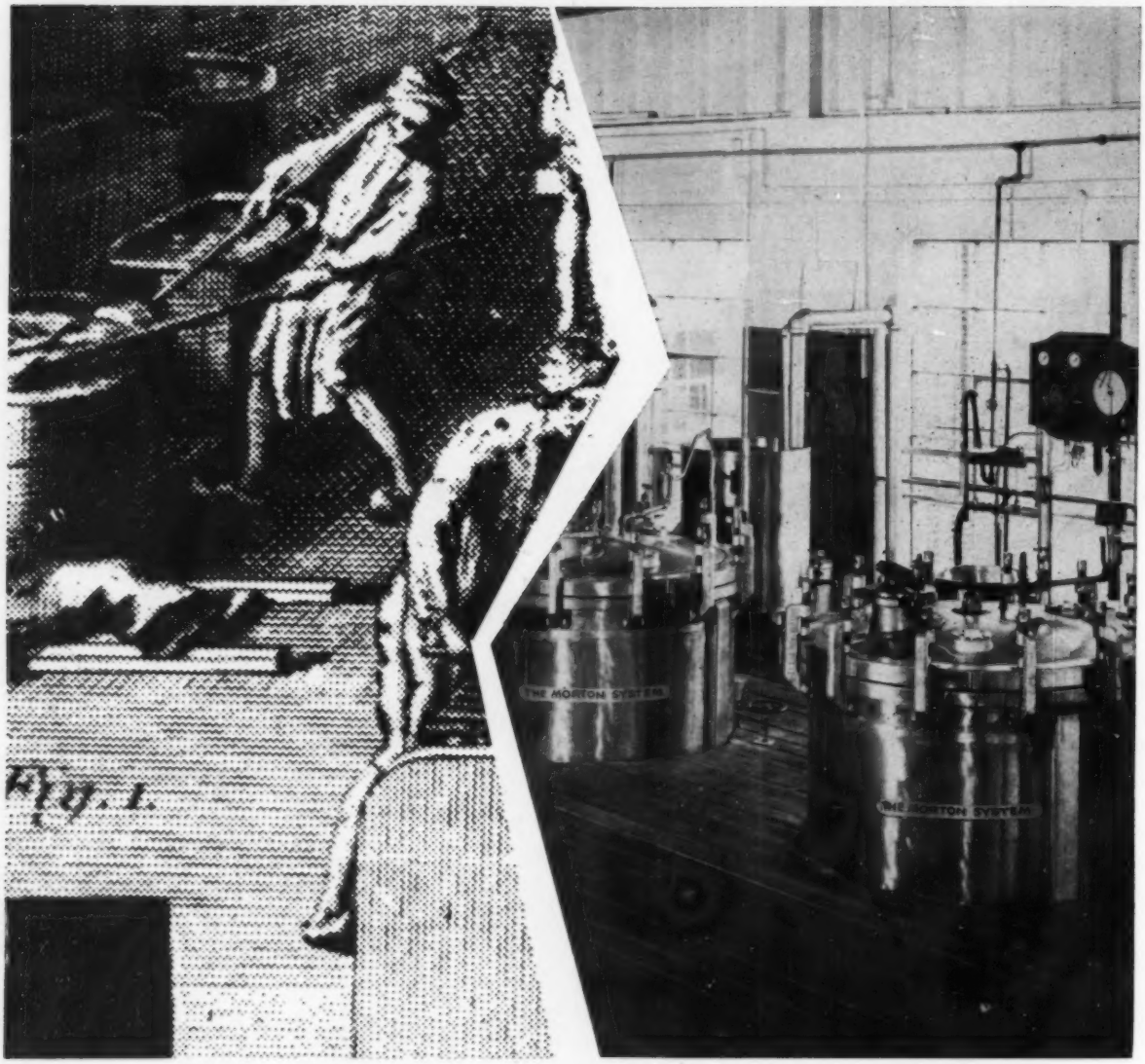
Becco Chemical Division

General Sales Offices:
161 EAST 42nd STREET, NEW YORK 17, N. Y.

Acrylic, Polyester, You Name It!...

Geigy Dyestuffs





MORTON MAKES LIGHT WORK OF IT!

In the old days dyeing was pretty rugged work and the results were sometimes worse than rugged.

Today, efficient, automatically controlled Morton System Dyeing and Drying Machinery makes light work of obtaining level shades.

Morton System Machinery thrives on rough day-in, day-out dyehouse treatment. You get better operating efficiency and better dyeing at temperatures up to 300° Fahrenheit.

Consult Morton's skilled engineers on your specialized situation.

MORTON
MACHINE WORKS, Inc.

FOUNDED BY STONEWALL JACKSON

Columbus — THE MORTON SYSTEM — Georgia, USA

MANUFACTURERS OF PATENTED DYEING AND BLEACHING MACHINERY • DRYING MACHINES • DYE BEAMS • STAINLESS STEEL TANKS • MORTON PUMPS • VALVES • FITTINGS • MILL SUPPLIES

James F. Notman
P. O. Box 216
Marion, Mass.

Parrott & Ballentine
3440 Augusta Rd.
Greenville, S. C.

Albert Bagian
316 Spencer St.
Philadelphia 20, Pa.

For further information use Handy Return Card, Page 191

TABLE 1
Pollution Potentials of Woolen Processes
Scour-and-Finish

	Mill BOD			Finish-Mill BOD		
Method I	% OWF[a]	% of Total[b]	% Red'n[c]	% OWF[a]	% of Total[b]	% Red'n[d]
Scour with soap	25.0	55.4	—	—	—	—
Stock dye with acetic acid	4.9	10.9	—	4.9	24.4	—
Card with 100% BOD oil Full with soap Wash with soap	15.0	33.3	—	15.0	74.6	—
Neutralize after carbonizing	0.2	0.4	—	0.2	1.0	—
Total	**45.1**	—	—	**20.1**	—	—
Method II						
Scour with 12% BOD detergent	22.1	74.6	—	—	—	—
Stock dye with ammonium sulfate	0.9	3.0	—	0.9	12.0	—
Card with 20% BOD oil Full with 12% BOD detergent Wash with 12% BOD detergent	6.4	21.6	—	6.4	85.3	—
Neutralize after carbonizing	0.2	0.7	—	0.2	2.7	—
Total	**29.6**	—	**34.0**	**7.5**	—	**63.0**
Method III						
Solvent scour, recover grease only	0	0	—	—	—	—
Wash out suint salts and dirt with 12% BOD detergent	10.0	58.9	—	—	—	—
Stock dye with ammonium sulfate	0.9	5.3	—	0.9	12.9	—
Card with 3% BOD oil Full with 12% BOD detergent Wash with 12% BOD detergent	5.9	34.7	—	5.9	84.3	—
Neutralize after carbonizing	0.2	1.2	—	0.2	2.9	—
Total	**17.0**	—	**62.0**	**7.0**	—	**65.0**
Method IV						
Scour with methyl and isopropyl alcohols, recover grease, suint	0	0	—	—	—	—
Wash out dirt with detergent	1.0	40.0	—	—	—	—
Stock dye with ammonium sulfate	0.9	36.0	—	0.9	60.0	—
Card with 3% BOD oil Full with sulfuric acid Wash with 12% BOD detergent	0.4	16.0	—	0.4	27.0	—
Neutralize after carbonizing	0.2	8.0	—	0.2	13.0	—
Total	**2.5**	—	**94.0**	**1.5**	—	**93.0**

a — based on oven-dried wool
b — based on the total of that particular method
c — based on the total of Method I (45.1% owf)
d — based on the total of Method I (20.1% owf)

basis in several mills and the full-soap BOD contribution may be reduced by 90%.

In at least one mill, *sulfuric acid* (0% BOD) has been used for fulling and the full-soap contribution could be reduced 100%. These substitutions could reduce the total plant BOD by approximately 20-30% in wool scouring and finishing mills and 50-70% in finishing mills.

Since the BOD load from carbonizing is so low, no substitutions need be made in this process.

The pollution potential of possible processing methods is detailed in *Table I* for four different combinations. Method I illustrates the processes used in the recent past and in many mills at the present time. In Methods II and III all of the individual process chemicals indicated have been used in some mills for some time.

In Method IV, only the methyl-isopropyl alcohol solvent scour process has not been fully tested on a production basis so far as the authors' experience is concerned. However, the process is detailed in the literature (5) and presumably it could be used.

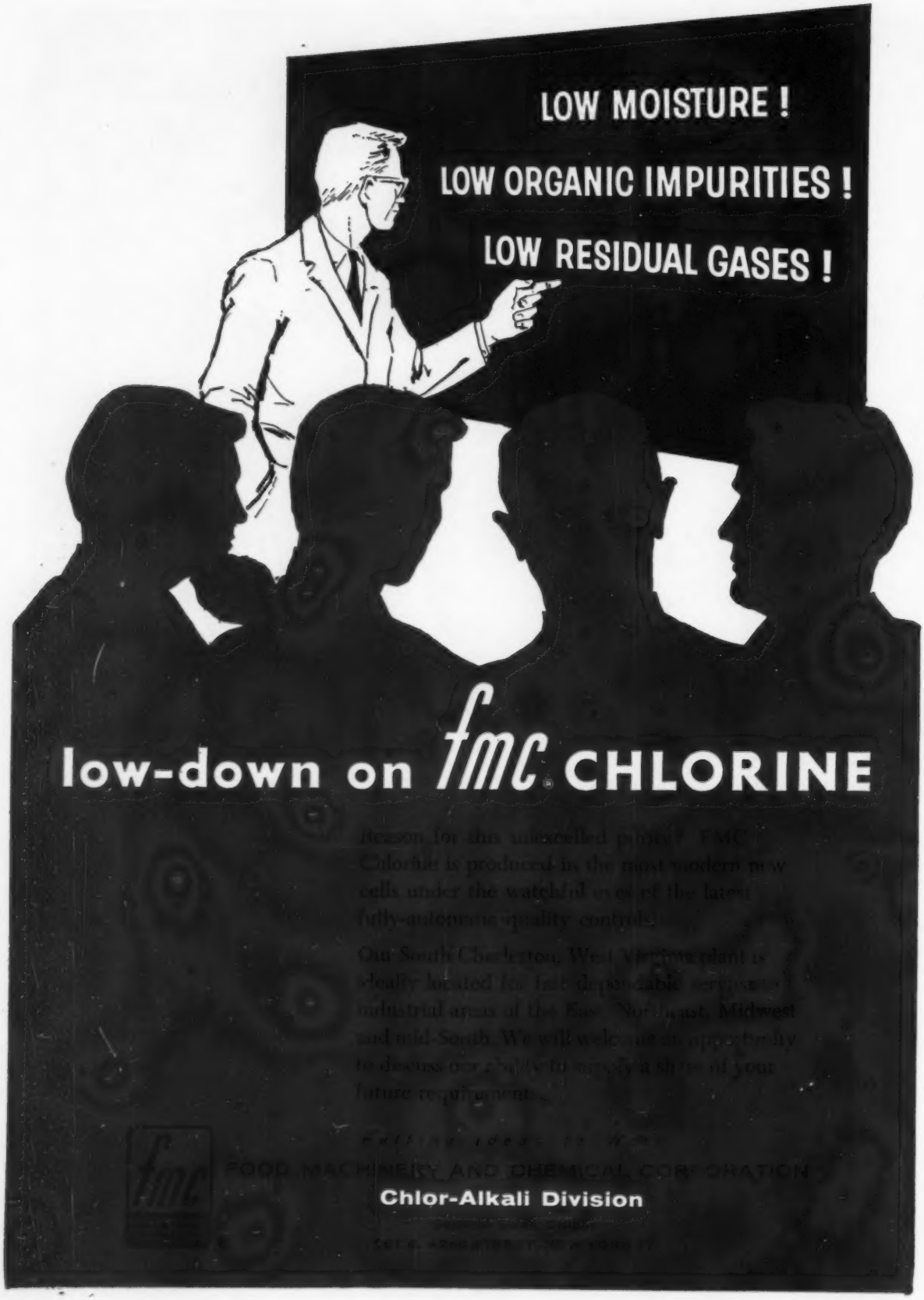
It should be noted that Method III will produce BOD reductions of 62% in wool scouring and finishing plants and 65% in finishing plants. Method IV will produce BOD reduction of 94% in scouring and finishing plants and 93% in finishing plants. These are substantial reductions, obtainable only through extensive treatment in expensive biological oxidation treatment plants. The recovery of grease and suint and savings in chemical costs will defray a considerable proportion of added expense, if any.

Summary and Conclusions. It has been shown that natural impurities extracted from the wool (wool wax and suint), soap, carding oils, and acetic acid produce practically all of the BOD from the wool industry. The natural impurities and the soap produce the bulk of the BOD and usually account for 75 to 90% in most mills.

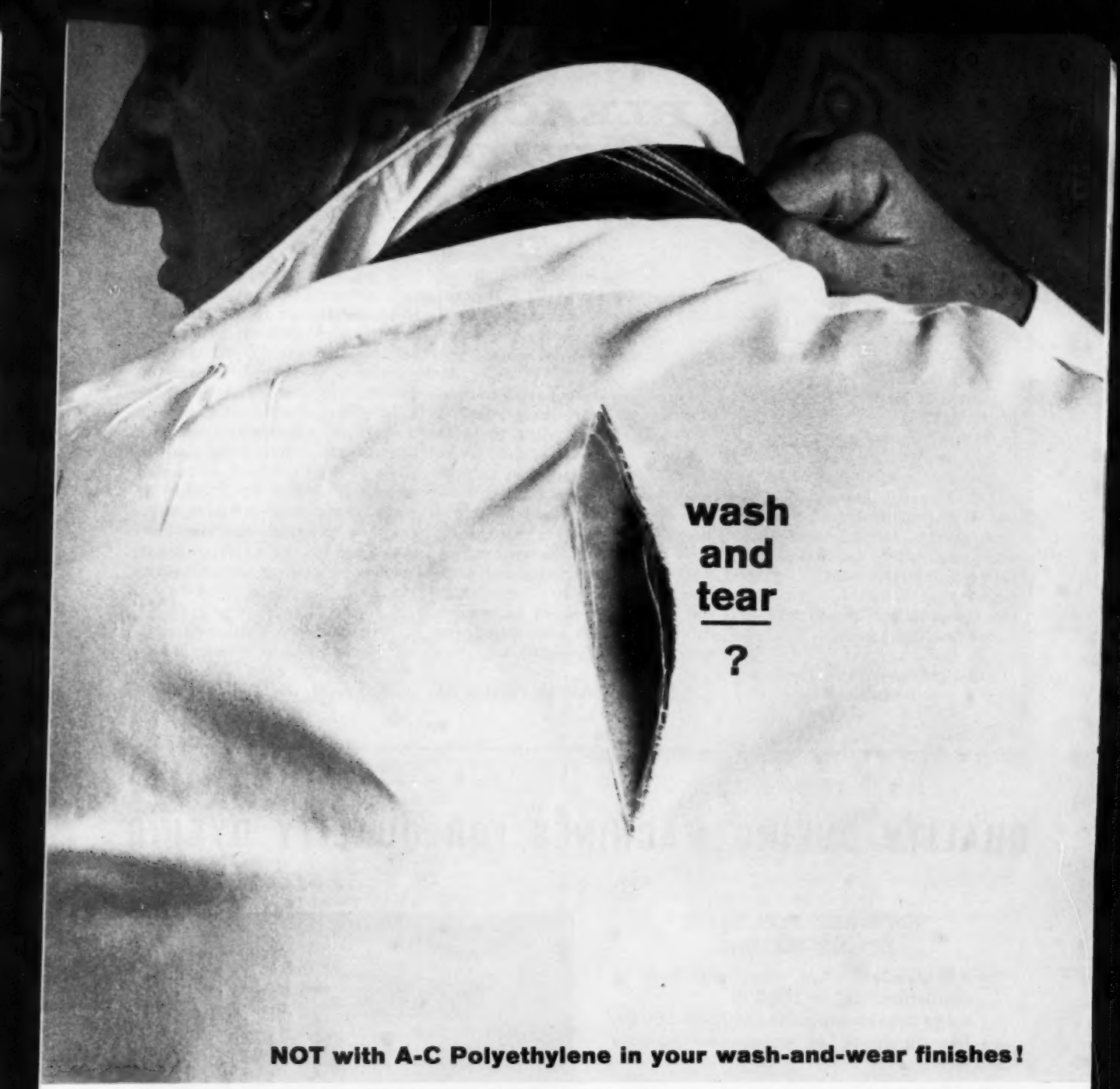
The natural impurities may be removed through solvent recovery and soap may be replaced by low-BOD detergent or sulfuric acid. Acetic acid may be replaced by ammonium sulfate and low-BOD carding oils (emulsified mineral oil, polyalkylene glycols) may replace the high-BOD oils usually used. These changes can reduce BOD loads by 60 to 90%.

All of the substitutes indicated (except methyl-isopropyl alcohol recovery) have been used on a production basis in some mill or other with satisfactory results and

Continued on page 142



For further information use Handy Return Card, Page 191



NOT with A-C Polyethylene in your wash-and-wear finishes!

Concerned over loss of tear strength caused by some wash-wear resins? A-C® Polyethylene can help you!

Combined with conventional resins, this new emulsifiable polyethylene overcomes such loss—actually raises tear strength to *above* normal. Imparts extra crease resistance, too. And A-C Polyethylene is permanent through multiple cleaning cycles.

Finishes formulated with A-C Polyethylene stay *white*, do not retain chlorine, resist scorching. They afford excellent abrasion resistance and antifrictional properties. Won't affect lightfastness or dye shades.

Ask your textile chemical supplier for an A-C Polyethylene finish for your specific needs. Or write for information to: Plastics Division, Dept. 614-TI, 40 Rector Street, New York 6, N. Y. In Canada: Allied Chemical Canada, Ltd., Montreal.

PLASTICS DIVISION
40 Rector Street, New York 6, New York

Allied Chemical

BASIC TO AMERICA'S PROGRESS

COLORING, BLEACHING, AND FINISHING DEVELOPMENTS

AATCC to NYC. American Association of Textile Chemists and Colorists will move its national headquarters from Lowell, Mass., to New York City. No moving date has been set.

Soiling Study Set. Why cotton fabrics get dirty and how they can be cleaned more easily and more thoroughly will be studied under a research contract awarded to Harris Research Laboratories by the U. S. Department of Agriculture. Studies will be directed toward establishing the relationship between physical-chemical surface properties and the soiling characteristics of cottons treated with selected finishing agents.

Experimental Wool Finishing. The International Wool Secretariat plans to set up an experimental wool finishing plant at an undisclosed location in the U.S. Reportedly, work at the new plant will at first be concentrated on easy-care finishes for wool fabrics.

Warp Yarn Dyeing and Printing. New equipment recently installed in a New Jersey plant provides for automatic dyeing of as many as 12,000 ends simultaneously on producers' beams, then putting them onto loom beams, ready for weaving. Provisions have also been made for printing the warp yarns, yielding the same pattern on both sides. The yarns are kept intact and there is no need to remove filling by hand, eliminating the second weaving operation.

Protective Finish on Fabrics. An English concern has introduced a fine polyethylene powder and a new processing technique claimed to render fabrics rotproof, waterproof, wear-resistant, and heat-sealable. In one method the dry powder is distributed across the moving web of cloth and fused into a pinhole-free coating by the application of heat at temperatures of up to 130 C. In another method, there is a partial surface coating treatment when the cloth is utilized for heat-sealing applications. A technique has also been developed for using the powder as a binder in making nonwoven fabrics.

Prevent Wool Felting. Details have been released of a technique for preventing the felting and shrinkage of wool by the forma-

QUALITY DYEING MACHINES FOR QUALITY DYEING

KWG REEL TYPE SKEIN DYEING MACHINE

- All stainless steel, non-hoist built to capacities 100 to 1000 lb.
- Hoist type to capacities of 75 to 600 lb.
- For all types of yarns and narrow fabrics.

Paddle Wheel machines in sizes from 2 to 850 lb.

Skein dyeing machines for zipper tape and narrow fabrics in capacities from 100 to 500 lb.

KWG DUO-FLO Circulating Type skein dyeing machines for high bulk orlon, other man made and natural yarns.

Klauder Weldon Giles MACHINE COMPANY Adams Avenue and Leiper Street, Philadelphia 24, Pa.

New fiber-identifying tints are easy to use, easy to rinse out

POLYMER REPORT

Polymer RINSEFREE® Tints are fugitive sighting colors for identifying lots of fibers during carding, roving, spinning, slashing, weaving . . . also warp overtint. They are easy to use, easy to remove.

Dilution: Dilute to the lightest tint that will provide easy identification. Proportions of water vary from 2 or 3 up to 8 or 10 parts to one part of tint. Simply stir the color into hot or cold diluting water.

Application: Apply with fine spray, drip or wick — as uniformly as possible.

Stability: Tinted yarn or cloth shows no appreciable loss of color for at least 2 years — at temperatures of 60 to 100°F.

Scouring: A cold rinse is often enough. Use lowest practical scouring temperature. Soap or detergent is not generally required.

Matching: RINSEFREE tints are spectrophotometrically standardized for lot-to-lot uniformity.

Storage: Polymer RINSEFREE Tints are supplied as stable water solutions that do not settle out.

Fibers on which RINSEFREE Tints are applicable

Acetate
Acrilan, Type 16 and reg. (Chemstrand Corp.)
Arnel (Celanese Corp.)
Cotton
Creslan (American Cyanamid Corp.)
Dacron (E. I. DuPont)
Darvan (Celanese Corp.)
Dynel (Union Carbide Chem. Corp.)
Kodel (Tennessee Eastman Chem. Corp.)
Nylon 66 or 6
Orlon Types 25, 39, 42 (E. I. DuPont)
Verel (Tennessee Eastman Chem. Corp.)
Viscose
Vycron (North American Rayon Corp.)
Wool
Zefran (Dow Chemical Corp.)

Colors available

Red (5 hues)
Yellow (2 hues)
Blue (2 hues)
Rust
Gold
Green

NOTE: Not all colors are completely rinse-free on all fibers. Removability also depends on whether yarns have been steamed.

Samples: Send list of fibers and blends being used and preferred colors (if any) for each type. We will be glad to send samples of suitable tints — together with complete directions. Polymer Industries' mill-trained textile chemists are available to help you.

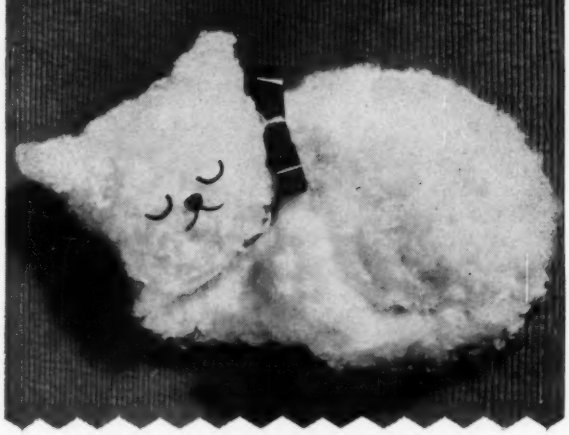
Address: Polymer Industries Inc., Dept. T7, Springdale, Conn. or Polymer Southern Div., Dept. T7, Box 2184, Greenville, S. C.

Polymer Industries

Polymers, copolymers, natural and synthetic products for sizing, printing, stiffening, softening, coating and laminating. Plants at Springdale, Conn. and Greenville, S. C.

NEW! *Cationic*

SOFTENER GW



FOR THE FIRST TIME . . .
A NON-YELLOWING
cationic SOFTENER

Luxuriously smooth . . . that's the way fabrics feel when finished with Softener GW.

Softener GW is Procter & Gamble's great new softening discovery. It was developed especially for use on "sensitive" fabrics that require a truly smooth hand . . . materials for baby clothes, lingerie, sweaters, hosiery, high count percale sheets . . . satins, fine dress materials, cottons, rayons and synthetics. Fabrics finished with Softener GW have an almost unbelievable softness and silky smoothness that can give you the competitive edge you've been looking for. Get all the facts and see for yourself.

ANOTHER GREAT PRODUCT FROM THE TEXTILE RESEARCH LABORATORIES OF PROCTER & GAMBLE

Mail this coupon for full information to:

PROCTER & GAMBLE, Specialty Products Department
Textile Finishes Section, P.O. Box 599, Cincinnati 1, Ohio

Please send full information on SOFTENER GW.

*Name*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

tion of a thin film of nylon over the surface of each fiber. The method involves first soaking in a cold aqueous solution of hexamethylene diamine, then in bath of liquid paraffin containing 1-2% of sebacyl chloride. An aqueous detergent is used to wash the coated fibers free of entrained paraffin.

New Dyes and Chemicals

Binder for Warp Size. A new universal binder for starch-based warp sizes is described as a water-dilutable solution of acrylic resin especially formulated to improve film strength, surface, and adhesion of starch to natural and synthetic fibers and their blends. Polymer Industries, Inc., supplier of the binder, reports that "Polyfilm B-2" improves conventional and modified starches and starch gums; it is supplied in liquid form and may be added at any point in the size cooking cycle. *(H-1)*

Binder for Nonwovens. "Chemigum 520" is a new product of the chemical division of Goodyear Tire & Rubber Co. It is a medium nitrile latex for use as a binder in nonwoven fabrics. *(H-2)*

Resin Finish. A new highly reactive derivative of acrolein is being offered in product development quantities by the Industrial Chemicals Division of Shell Chemical Co. "Aldocryl Resin X-12" is reported to be useful in the shrinkproofing of rayon and the creaseproofing of cotton. The resin is non-nitrogenous, water soluble, and is supplied as a 50% aqueous solution. *(H-4)*

New Reactives. Sandoz, Inc., has added four new colors to its line of Drimarene-Z reactive dyes: Golden Yellow Z-R paf, Yellow Z-5GL paf, Bordeaux Z-BL paf, and Navy Z-2RL paf. All are recommended for printing and pad dyeing, and are stated to have the special characteristics of this class of reactive dyes, including brilliance of shade, high fastness to washing, and easy rinsing of unfixed dye. *(H-5)*

Wash-and-Wear Resin. A new reactant thermosetting resin, "Onyxset A," is recommended by Onyx Chemical Corp. for the production of wash-and-wear and permanent mechanical finishes where resistance to chlorine retention is not required. *(H-3)*

◆ *For more data on any of these dyes and chemicals, write supplier or use postage-free card on page 191, listing in space provided the code (H-1, H-2, etc.) in parentheses at end of descriptions.*

exsize
for extra-fast desizing!

Why do so many experts prefer EXSIZE?
. . . . . because of controlled uniformity
. . . . . because of high heat stability
. . . . . because of high enzyme strength

These extras mean safe, dependable, speedy desizing. Keep your desizing section ahead in the production race.

Order EXSIZE soon . . . for more than 40 years, the world's finest desizers.

Write today for your free copy

INDUSTRIAL PRODUCTS DIVISION
PABST BREWING COMPANY
Milwaukee, Wisconsin

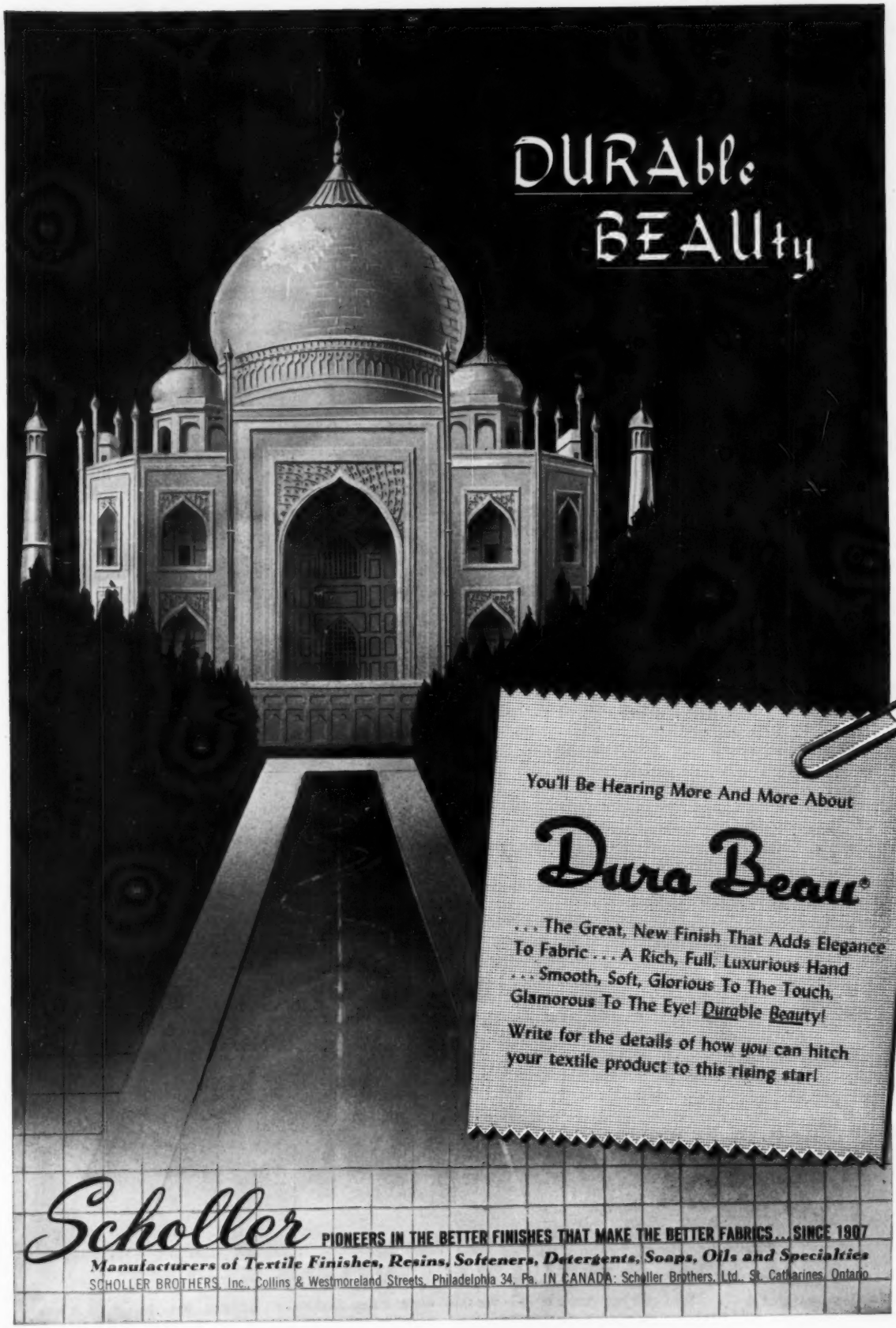
Wool processing

(from page 137)

little or no difficulty is expected when these changes are made. There is no reason why the industry should not use these processes to help reduce pollution in the nation's streams.

There also is apparently no reason why federal and state pollution abatement authorities should not issue orders to such mills to stop polluting our greatest natural resource, since minimum costs would be involved in the changes. It behooves the industry to invest-

For further information use Handy Return Card, Page 191


DURAble
BEAUty
You'll Be Hearing More And More About
Dura Beau®
. . . The Great, New Finish That Adds Elegance To Fabric . . . A Rich, Full, Luxurious Hand . . . Smooth, Soft, Glorious To The Touch, Glamorous To The Eye! Durable Beauty!
Write for the details of how you can hitch your textile product to this rising star!
Scholler
PIONEERS IN THE BETTER FINISHES THAT MAKE THE BETTER FABRICS . . . SINCE 1907
Manufacturers of Textile Finishes, Resins, Softeners, Detergents, Soaps, Oils and Specialties
SCHOLLER BROTHERS, Inc., Collins & Westmoreland Streets, Philadelphia 34, Pa. IN CANADA: Scholler Brothers, Ltd., St. Catharines, Ontario

igate these processes and eliminate any difficulties which may be involved.

Investigations on other desirable substitutes should be instituted and consulting help should be made available to the various mills which may be forced to reduce their pollution loads. Savings in costs should be very high since in many instances the need for building expensive treatment plants will be eliminated.

References

1. Burford, M. G., Masselli, J. W., Snow, W. J., Campbell, H., and DeLuise, F. J., "Industrial Waste Surveys of Two New England Cotton Finishing Mills." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts (1953).
2. Masselli, J. W., and Burford, M. G., "Pollution Sources in Wool Scouring and Finishing Mills and Their Reduction Through Process and Process Chemical Changes." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, June, 1954.
3. Masselli, J. W., and Burford, M. G., "Pollution Sources from Finishing and Synthetic Fibers." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, June, 1956.
4. Masselli, J. W., Masselli, N. W., and Burford, M. G., "A Simplification of Textile Waste Survey and Treatment." Report to New England Interstate Water Pollution Control Commission, Boston 8, Massachusetts, July, 1959.
5. Taylor, W. H., "Alcohol Extraction of Wool Wastes," *Sanitalk*, 2, 25-26 (1954).

Water repellent *(from page 119)*

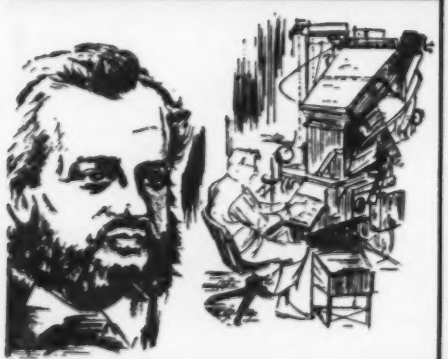
washed for 1 minute, using 140 F water, and dried on the dry cans at 240 F.

In this estimate the processing rate was assumed to be 120 yards per minute. Costs were computed for treating 5.5-oz (per square yard), 42″ poplin to an add-on of about 2.5 per cent by weight (excluding the triazone) or 6.5 per cent by weight (including the triazone). Hypothetical plants were operated for one and three shifts for 250 days per year, and for three shifts for 350 days per year. Annual plant capacities were thus varied from 14.4 million linear yards up to 60.5 million linear yards.

Investment Costs. Installed equipment costs (see *Tables 1* and *2)* are estimates based largely on costs obtained from manufacturers for individual equipment units for continuous processing at the specified rate. The three-roll pad is equipped with a stainless steel single dip pan on both sides of the nip. The face of all rolls would be 50″ wide.

Also included are cross members of stainless steel for wet service and stainless steel idler lead-on and lead-off rolls. The frame, a clip-type with housing that can be gas or steam heated, is provided with a 10-hp drive and can accommodate fabrics up to 60″ wide. The roller curer can also be gas or steam heated, and is provided with fans and coils. The continuous washing range is a 10-compartment, open-width washer with four rolls to each compartment and has eight light duty squeezers and one heavy

FIRST
from BALTIMORE
OTTMAR MERGENTHALER
invented the world's first TYPESETTING MACHINE in BALTIMORE in 1883 and revolutionized the printing industry.



AND ALSO FROM BALTIMORE...
YOUR FIRST CHOICE IN BLACKS
• DIRECT
• ACID
• DEVELOPED
• ACETATE
• FORMALDEHYDE
• LOGWOOD
THE HOUSE OF BLACKS
Consult your local dyestuff distributors for information and samples. Shipments can be made from our Baltimore factory.
Courtesy — The Baltimore News-Post

YOUNG ANILINE WORKS, INC.
OFFICE AND FACTORY: 2701-2755 BOSTON STREET • BALTIMORE 24, MARYLAND

For further information use Handy Return Card, Page 191

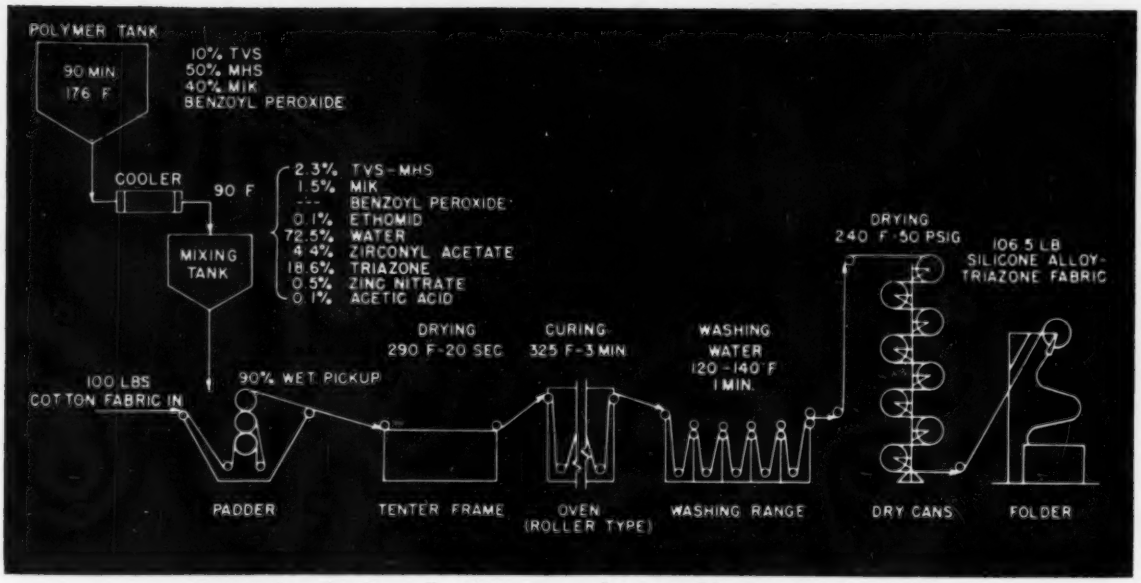


FIG. 1. Applying the silicone alloy-triazone compounds to cotton fabric to impart water repellency.

duty squeezer on the end of the unit.

The washing range would be constructed entirely of stainless steel and have stainless-steel top rolls and immersion rolls. The final drying unit consists of 3 vertical stacks of 8 dry cans each, and is equipped with Type 304 stainless-steel, ball-bearing journal, rotary pressure joints, syphon pipes, and steam and condensate manifolds. The lead-on and take-off rolls are also constructed of stainless steel.

Total plant costs are listed in *Table 3* and were determined using new equipment, buildings, and auxiliary facilities. The percentages applied to equipment costs in estimating installation costs, process piping, instrumentation, and outside lines were selected from published information (1,2,4,5). Buildings would be of steel, concrete, and brick, with service facilities such as heating, ventilation, sanitary plumbing, lighting, and sprinklers. Building costs were estimated at $20 per square foot.

Engineering and construction costs and contingencies were each estimated at 20 per cent of total physical plant costs, and were included in total plant costs.

Processing Costs. Processing costs are tabulated in cents per linear yard in *Tables 4* and *5*. Detailed costs are tabulated for the alloy treatment alone and for the alloy-creaseproofing resin combination treatment. Processing costs are also tabulated in cents per square yard and cents per pound of fabric in *Table 6*.

Chemical costs were calculated from chemical requirements, indicated in *Figure 1*, using current prices. From *Tables 4* and *5*, it can be seen that chemical costs are the largest single cost.

Labor costs were estimated as those applicable to a textile finishing plant, with allowances for one senior operator at $2.35 per hour, one operator at

Continued on page 187

TABLE 1

Continuous Silicone Alloy Treatment of Cotton Fabric[1]—Installed Equipment Costs

No.	Equipment	Installed Cost
1	150-gal polymer tank, steel	$ 150
1	Polymer agitator	200
1	Reflux condenser	150
1	Heat exchanger	615
2	3000-gal mixing tanks, steel	1290
2	Mixing agitators	6340
1	3-roll padder	12,500
2	80-ft tenter frames	151,200
2	540-ft roller curers	62,400
2	Pumps with motors	1660
		$236,505[2]

[1]*5.5-oz cotton poplin, 42" wide, at 120 ypm.*
[2]*For operating one shift for 250 days per year, installed equipment cost would be approximately $4000 less because of smaller processing tanks.*

TABLE 2

Continuous Silicone Alloy-Triazone Treatment of Cotton Fabric—Additional Installed Equipment Costs[1]

No.	Equipment	Installed Cost
1	10-compartment open-width washer	$62,500
3	Stacks of 8 drying cans	23,335
1	Washer pump with motor	830
		$86,665

[1]*In addition to equipment required for silicone alloy treatment alone, the listed equipment would be required for the triazone combination treatment.*

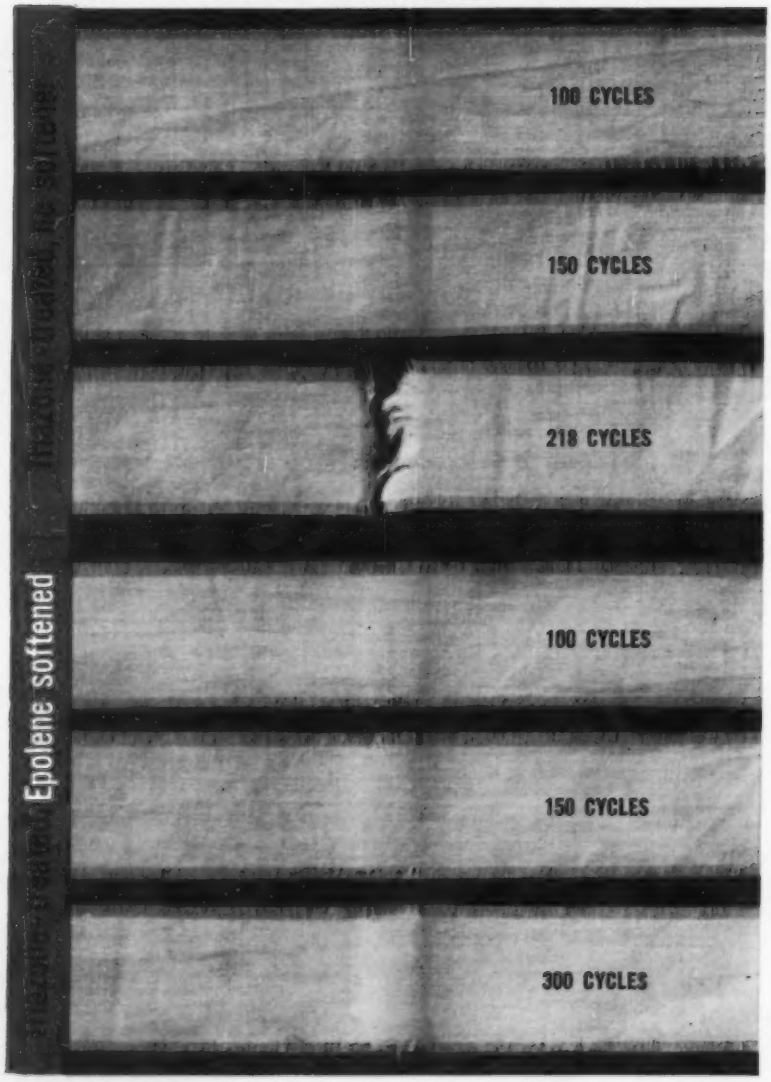
TABLE 3

Continuous Silicone Alloy Treatment of Cotton Fabric—Total Plant Costs

(Plant capacity 60,480,000 yards per year)

a.	Installed equipment	$236,505
b.	Process piping (13% of "a")	30,745
c.	Instrumentation (3% of "a")	7095
d.	Outside lines (3% of "a")	7095
e.	Auxiliary facilities	21,650
f.	Buildings	120,460
g.	Total physical plant cost	$423,550
h.	Engineering and construction (20% of "g")	84,710
i.	Contingencies (20% of "g")	84,710
j.	Total plant cost	$592,970

The Stoll-Flex Abrasion Test demonstrates the increased strength given to a resin-treated cotton fabric by an Epolene softener.

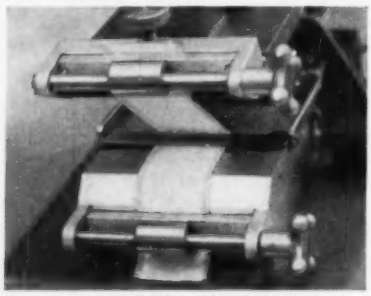


IT is axiomatic in the textile industry that the finishing resin alone does not a wash-and-wear fabric make. In fact, the variables are many, and often complex.

Of primary importance is selection of the softener. If properly chosen to match the specific type of finishing resin to be used, the combination can provide the optimum in tear strength, abrasion resistance, crease recovery, hand, and sewability for the treated fabrics.

Eastman offers three emulsifiable types of polyethylene resins for use as softeners... Epolene E-10, Epolene E-11, and Epolene E-12. These low-molecular-weight polyethylenes are suitable for either nonionic, anionic, or cationic systems, easily forming emulsions that are stable and low in color.

Epolene polyethylene emulsions have been evaluated under operating conditions with all of the principal wash-and-



Stoll-Flex Abrader

wear resins in use today. These include triazone, triazene, melamine formaldehyde, methylated melamine formaldehyde, dimethylol ethylene urea, and methylated urea-formaldehyde type finishing resins. The results of these test procedures are available to aid you in selecting the right softener for your finishing requirements.

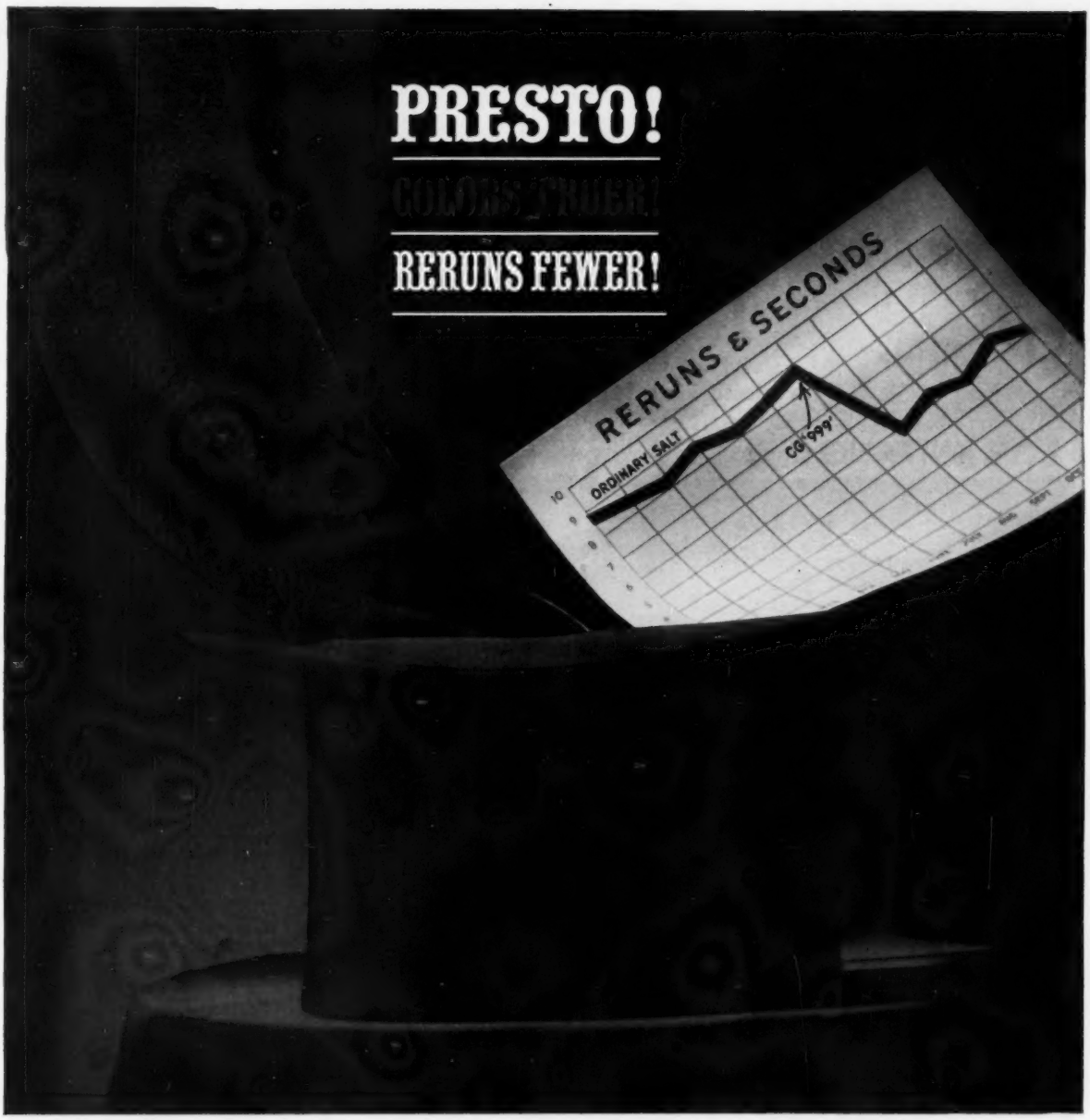
For further information about Epolene textile emulsions, their preparation and use, contact your Eastman representative, or write Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tenn.

Epolene®

EASTMAN LOW-MOLECULAR-WEIGHT POLYMERS

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; Atlanta; Boston; Buffalo; Chicago; Cincinnati; Cleveland; Detroit; Greensboro, N. C.; Houston; Kansas City, Mo.; New York; Philadelphia; St. Louis. **Western Sales Representative: Wilson & Geo. Meyer & Company,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

For further information use Handy Return Card, Page 191



With Morton Chemical Grade '999' Salt

It's not magic . . . but sometimes the results you get when you switch to high purity Morton Chemical Grade '999' Salt seem almost magical! Colors are truer . . . exactly as the manufacturer intended them to be. And reruns and seconds often drop 50%—as shown by actual records.

With salt of average purity, calcium and magnesium compounds complex dyes and reduce their effectiveness. But with high purity Chemical Grade '999,' you get 99.95% pure sodium chloride with a trace of sodium sulphate—as recommended whenever commercial calcium-free salt is required.

When Cost Is the Determining Factor, Use Morton Purex Salt. Morton Purex Salt is the ideal salt for textile use when high purity is not essential. Purex is guaranteed to have a minimum purity of 99.5%, and to be 100% soluble. Like Chemical Grade '999,' and all other grades of Morton Salt, it is easily and quickly available anywhere in the U.S.

MORTON SALT COMPANY Industrial Div.
Dept. TI-8, 110 N. Wacker Drive, Chicago 6, Ill.

Please send me more information about

- ☐ *Morton Chemical Grade '999' Salt*
- ☐ *Morton Purex Salt*
- ☐ *I would like to talk to a Morton representative about other grades of salt used in the textile industry.*

*Name*_____

*Title*_____

*Company*_____

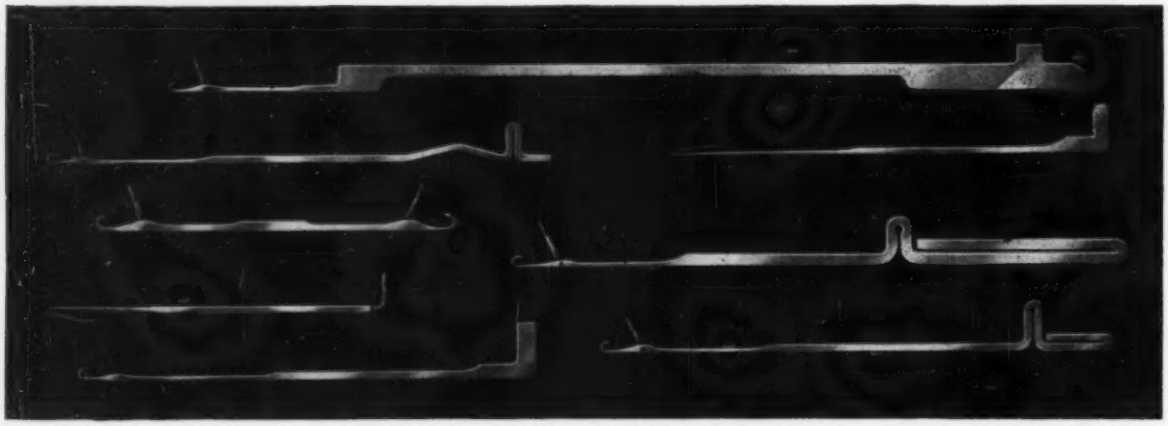
*Address*_____

*City*_____ *Zone*____ *State*_____

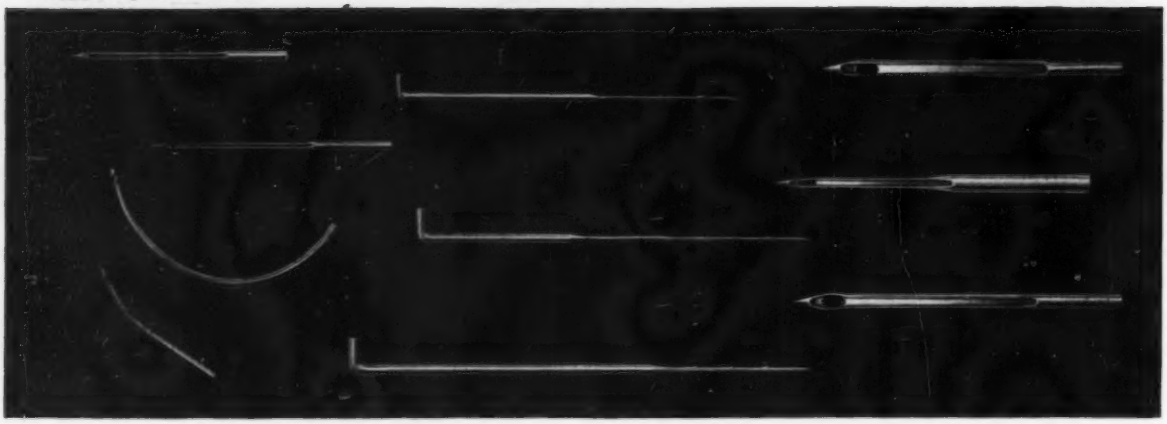
DON'T FORGET...

whatever your machine needle requirements, Torrington can supply you promptly, from conveniently located branches, with the right needles.

FOR KNITTING



FOR SEWING FOR FELTING FOR TUFTING



THE TORRINGTON COMPANY

Established 1866

Torrington, Conn., U.S.A. • Bedford, P.Q., Canada
Coventry, England • Genoa, Italy

Branches to serve you are located in: New York • Philadelphia • Chicago • Boston • Greensboro, N.C. • Atlanta • St. Louis • Toronto, Ontario, Canada
Broadgate House, 7-10 Eldon St., London E. C. 2, England • Pacific Coast Representative: E. G. Paules, 1762 W. Vernon Ave., Los Angeles 62, Calif.

TORRINGTON MEETS EVERY NEEDLE NEED: SEWING · KNITTING · TUFTING · FELTING

For further information use Handy Return Card, Page 191

KNITTING SECTION

Based on a duplicating machine, Pyramid's order handling system gets finished goods to the place that counts—in customer's hands

Exclusive

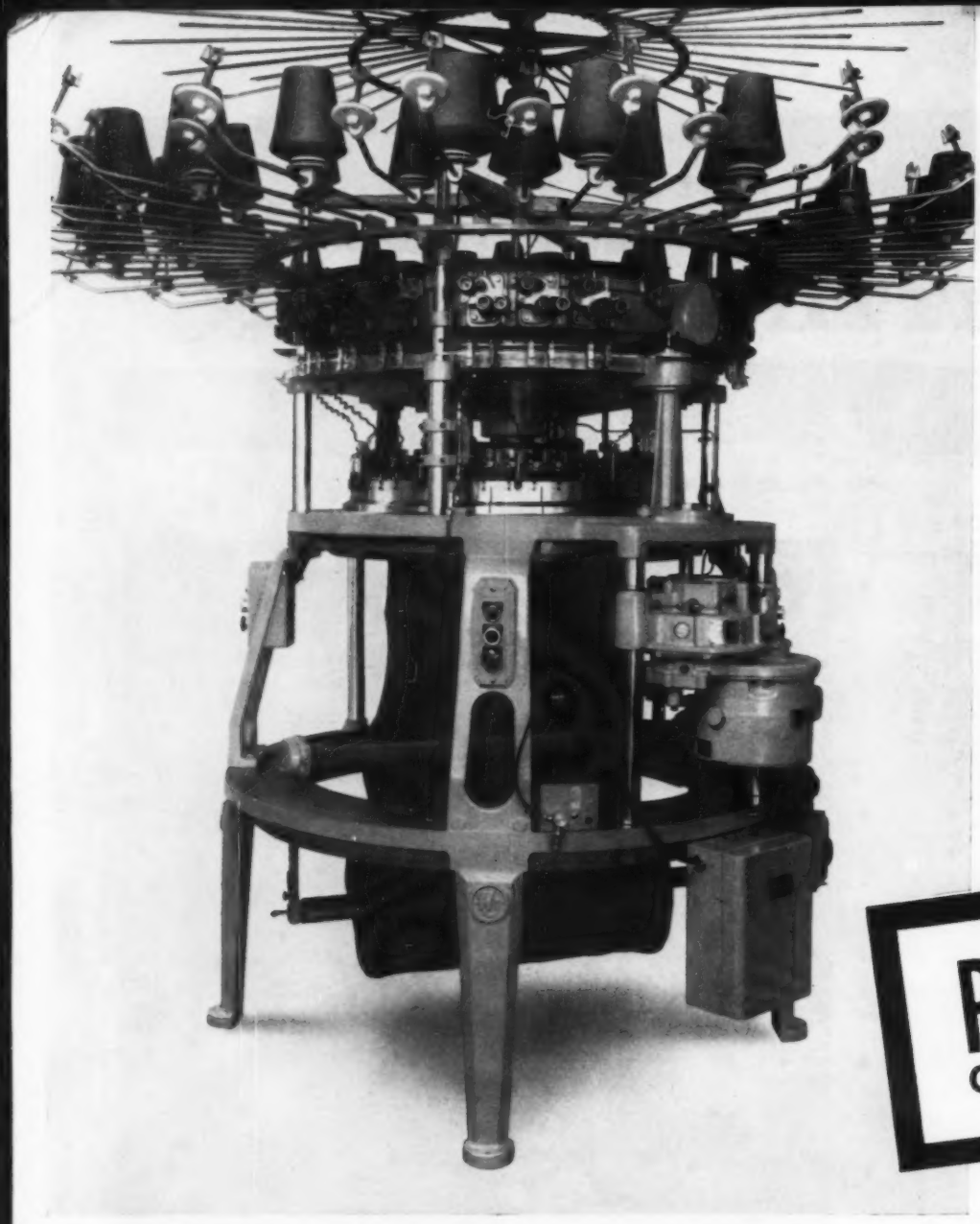
Using the machines in foreground, Pyramid "gets the goods off the floor and into the customer's hands as soon as they are finished." Standing is Pyramid's Lawrence King.

Less paper work... ...happier customers

GETTING the goods out on time is one of the most important jobs in the fast-changing fashion business. Pyramid Manufacturing Co., a New York firm that specializes in knitted trim cloth for a number of manufacturing customers, had been very successful in devising speedy production methods and patenting its own machines for the manufacture of its custom-made goods. However, machine operations have to be paced and directed by paper work if goods are to get to the customer on time and billing is to be up-to-the-minute.

Recently, Pyramid adopted a system that introduced into its paper-work procedures the same degree of automation that it had enjoyed in its production. So now its customers get the full benefit of its advanced manufacturing methods.

"Our production methods were fast and efficient," remarks Methods Engineer Lawrence King. "But the customer is not interested in



PBP-44
CHALLENGER

PRESENTING THE "CHALLENGER"

Added to Wildman Jacquard's fine family of knitting machines is the all new 30" diameter, 44 feed **"Challenger"**.

The **"Challenger"** is a high production yard goods circular knitting machine for the production of double pique fabrics. Its rugged, modern styled frame, together with a new heavy dial support stem, provides the rigidity so necessary for the high production of quality fabrics.

Rearrangement of the needles or dial sections (which are made interchangeable) enables the following fabrics to be produced: double pique, Swiss or French knit . . . single pique . . . eightlock . . . full rib . . . multicolor checks or block plaids . . . the various tuck effects . . . double jersey . . . French welt fabrics and stripes.

WILDMAN JACQUARD

WILDMAN JACQUARD CO. • 1210 STANBRIDGE ST. • NORRISTOWN, PENNA. • MANUFACTURERS OF HEMPHILL BANNER KNITTING MACHINES

A Subsidiary of Draper Corporation, Hopedale, Mass.

Manufacturers of the only circular knitting machines using a true Jacquard patterning mechanism

how fast goods are manufactured — its how fast they get to him that counts. We had, therefore, to create a system that would get goods off the floor and into the customer's hands as soon as they were finished."

Pyramid's average order covers six to ten items of custom made materials, involving up to ten partial shipments for each item. As each item should be shipped to the customer upon completion — and not held up until all of the items are completed — this presented a cumbersome and time-consuming paper work problem. Each partial shipment, for example, must be billed separately as it is made, and the back ordered items and quantities must be shown on the shop order copies for the benefit of the shop. Contents memorandum and packing slips must also be issued for each shipment.

Before adopting the Ormig system, the company employed snap-out sets to create these copies. This involved constant rewriting, as one snap-out set was issued for the shop order copy and separate ones for the invoices to cover each partial shipment as made. It was not possible under this method to combine the writing of both shop orders and invoices in one operation, as the information for the shop listed internal data on machines and procedures.

Back ordered quantities were shown on the shop orders simply by crossing out the previous figure and writing in the balance. Since there could be as many as ten shipments for a single item, there was much rewriting and pencilling out on the order forms, with the resultant possibility of confused orders, mis-directives, and incorrect information. This in turn sometimes led to over-production of custom-made items — an expensive mistake in the fashion business.

With 40 to 50 back orders being processed per day, clerks continuously rewrote and transcribed. To insure correctness, they spent additional time visually checking each order. Furthermore, the shop lost production time in reading the complex-appearing order slips slowly and carefully, to insure the correct items and amounts being manufactured.

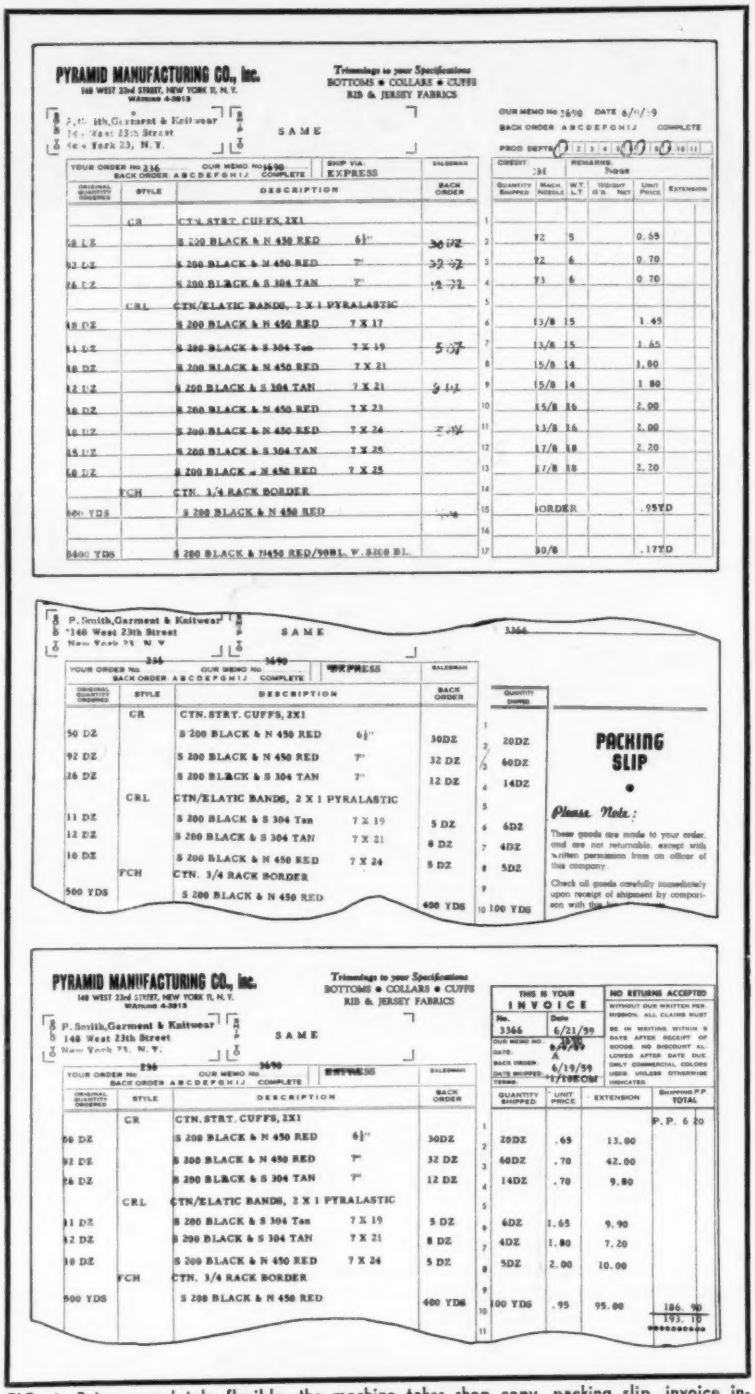

PYRAMID MANUFACTURING CO., Inc.
148 WEST 23rd STREET, NEW YORK 11, N.Y.
Trimmings to your Specifications
BOTTOMS • COLLARS • CUFFS
RIB & JERSEY FABRICS
P. Smith, Garment & Knitwear
148 West 23th Street
New York 23, N.Y.
SAME
PACKING SLIP
Please Note:
INVOICE
No. 3366
Date 6/21/59
EXPRESS
CTN. STRT. CUFFS, 2X1
CTN/ELATIC BANDS, 2 X 1 PYRALASTIC
CTN. 3/4 RACK BORDER
S 200 BLACK & N 450 RED
S 200 BLACK & S 304 Tan
S 200 BLACK & S 304 TAN
NO RETURNS ACCEPTED

FIG. 1. Being completely flexible, the machine takes shop copy, packing slip, invoice information, single items, etc., off a master list. There is no transcribing, rewriting.

A System Is Born. What Pyramid needed, management decided, was a system that would eliminate rewriting, insure accuracy, cut clerical costs, and provide the shop with instructions that did not require deciphering, searching, or screening. Such a system must speed up paper work and shatter the shipping bottleneck.

Continued on page 171

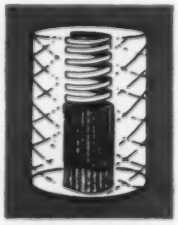
Franklin Colorbred Yarns

Trade Mark

THEY PROVE THEIR QUALITY HERE

Just as Franklin Colorbred Yarns are finished and wound to deliver properly at your knitting machines, or in winding or warping, so are they dyed to stand up to finishing specifications. We determine in advance in our laboratories the relative fastness of various dyestuffs and select them accordingly for a specific purpose.

Of course you want uniformity of shade also, and Franklin Colorbred Yarns have it. That's because of the Franklin Compressible Spring Package. Soft packages compress more and hard packages less, into a column of uniform density. Uniform penetration of dye liquor and uniform shades consistently follow.



X-ray view of Franklin Package — the "secret" of uniform shades. Don't say "package dyed". Say . . . "FRANKLIN COLORBRED"

Our representative is at your service. Contact our nearest plant or office and ask him to call.

*Fashion-Right and Quality Controlled

Franklin Process

COMPANY

Largest Package Dyers in the World of Natural and Synthetic Fiber Spun Yarns for More than Half a Century

DIVISION OF INDIAN HEAD MILLS, INC.

Sales Offices and Plants at —
Greenville, S. C. • Chattanooga, Tenn. • Fingerville, S. C.

Sales Offices only in —
Philadelphia — Howard & Clearfield Sts.
New York — 111 West 40th St. Providence — 611 Turks Head Bldg.

493-O

For further information use Handy Return Card, Page 191

OIL! OIL! OIL!

Not 1 in 10 users of SCP and SCOP machines lubricates them adequately

by Paul E. Howard

Exclusive

ACCORDING to a check among mills operating SCP and SCOP knitting machines, not one in ten follows the lubrication practices recommended by the machinery manufacturers. A majority of the complaints involving worn-out machinery are traced directly to inadequate lubrication.

This poor lubrication may cause as much as 65% of the "excessive" wear reported: poor machine adjustments may cause the remaining 35%. Yet there are simple routines that assure normal parts life will not suffer from lack of oil or grease:

1. Apply SAE No. 30 oil daily to the main bearing supporting the long sleeve gear and to the small main bearing supporting the bevel gear on the opposite side of the frame. Bearings suffer most.

2. Apply SAE No. 30 daily through the oil hole in the 26-tooth gear located on the main shaft and operated by the quadrant. This is a critical point.

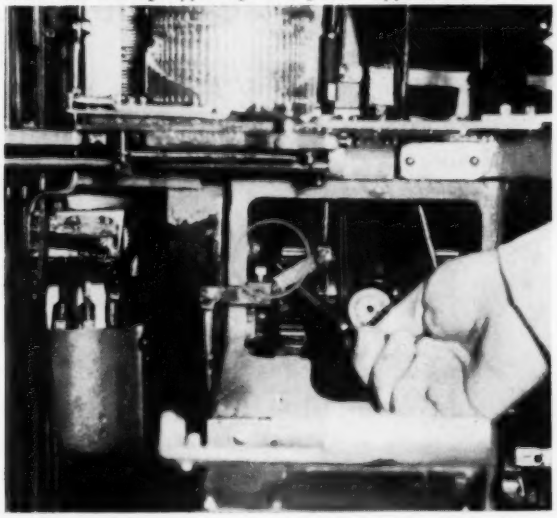
3. Through the small oil cup located between the two front selector banks, daily apply SAE No. 30 to the bed plate gear.

4. Daily add SAE No. 30 to the two bearings (on either side of the machine) supporting the chain driven shaft that rotates the control drums. The oil holes clog easily, so clear them with a needle hook or other effective tool before oiling.

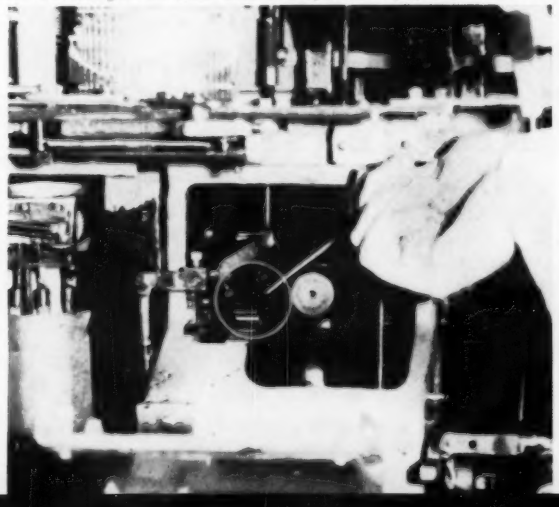
5. Add SAE No. 30 daily to the long bearing supporting the chain

Daily oil the main bearing supporting the long sleeve gear.....

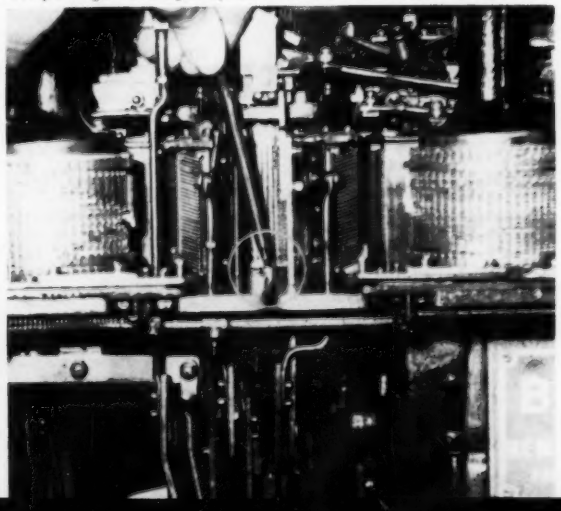
small main bearing supporting bevel gear on opposite side .....

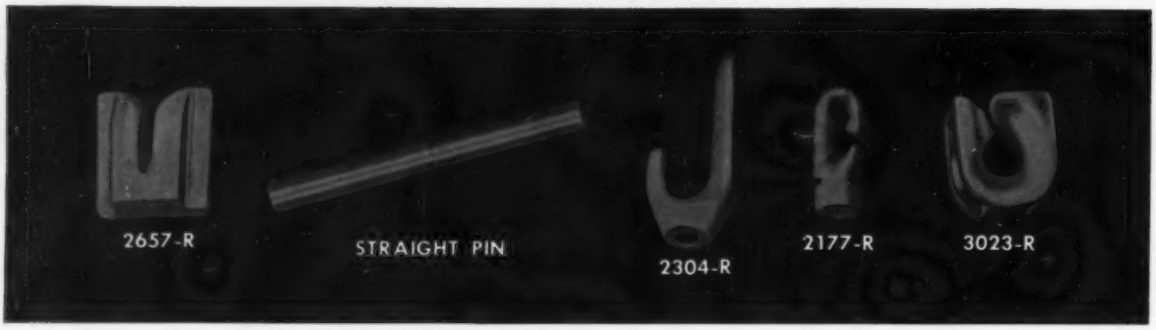


the 26-tooth gear on main shaft and operated by quadrant.....



bed plate gear through cup between two front selector banks.....





"Rutex" TITANIA THREAD GUIDES by MITCHELL-BISSELL

Not Just a Wear-Resistant Surface, but the Same Hard, Dense Material All the Way Through!

Mitchell-Bissell "Rutex" Thread Guides are made from a special homogeneous Titania compound that provides a perpetually hard, smooth wearing surface no matter how deeply the thread may wear into the guide. There is no outer surface to wear through and put an early end to the guide's usefulness. Introduced by Mitchell-Bissell at the recent Southern Textile Exposition, these quality guides were enthusiastically received.

Mitchell-Bissell "Rutex" Thread Guides provide a three-way saving . . . lower first cost, longer service, less downtime. That extremely hard, smooth contact surface never changes because it is characteristic of **all** the material from which the entire guide is made. **Wear-resistance never ends!** You can use these new guides with complete confidence in their quality, efficiency and economy.

"Rutex" Titania Guides are available in many of our standard Porcelain thread guide patterns. For prices, please give Porcelain pattern number, or send sketch or sample of guide you are now using.

EST. 1882

MITCHELL-BISSELL CO.

TRENTON, NEW JERSEY

Southern Representative: HOLT ASSOCIATES, INC., *Greensboro, N. C.*

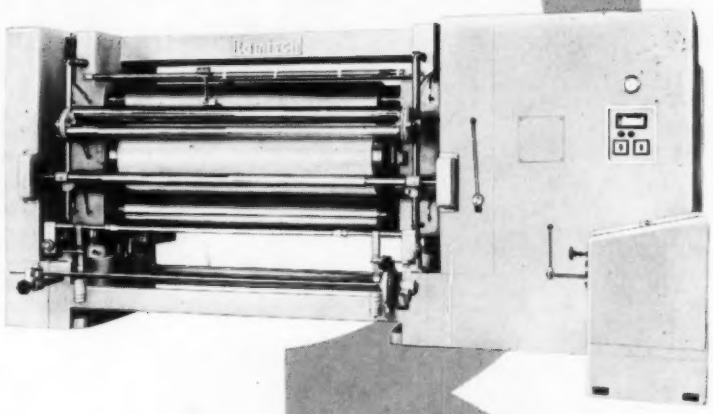
The Only Manufacturer Offering a Complete Line of All Types of Ceramic and Wire Guides for the Textile Industry.

For further information use Handy Return Card, Page 191

TRIPLE PURPOSE RAMISCH TRICOT SCHREINER CALENDER

THIS VERSATILE MACHINE REQUIRES ONLY 30 MINUTES TO CHANGE OVER FROM—

- Schreinering
- Flat Embossing
- Relief Embossing



We have added this renowned equipment to our line because we believe it is unexcelled in construction, performance and range. Its multi-functional usefulness permits mill-owners a variety of finishes plus substantial savings. Briefly, some of its unique features are:

The upper bowl for each of the various processes can be readily removed owing to a special roller coupling device. You need no more than 30 minutes to detach the bowl from the calender frame and exchange it for another, without disturbing drive or drive gear.

Dr. Ramisch & Co. in West Germany are one of the most experienced firms in the calender line. Its many products cover the entire range and needs of the textile industry.

Reiner also offers machines for handling woven goods, for laboratory use, and special effects.

Complete descriptive literature, Schreinering and other sample swatches upon request.

ROBERT REINER, INCORPORATED

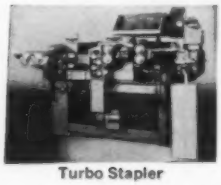
Telephone: UNion 7-0502—From New York City call LOngacre 4-6882.

WEEHAWKEN (Only 10 minutes from Times Square by direct bus) NEW JERSEY

AN HONORED NAME IN TEXTILE MACHINES SINCE 1903.

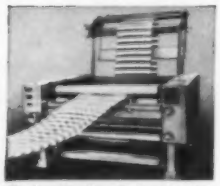
ONE TURBO DEMONSTRATION is worth a thousand words

Bring your fibers, your fabrics or your finished garments to Turbo – and see for yourself what Turbo Machines can do for you. A staff of experts will deal with your special problems.

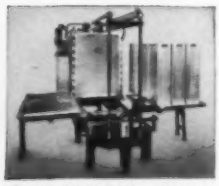


Turbo Stapler

Turbo Dye Boarder



Turbo Padder-Extractor for Tubular Knits



Turbo FS-300 Fiber Setter

Turbo Finisher for Tubular Knits

Turbo Package Dyeing and Drying Machines

Turbo Tow Processing Machine

Turbo Electro-Finisher

For Hosiery:
- DYE BOARDER
- PRE-BOARDING MACHINES
- BOARDING MACHINES

For Tubular Knit Fabrics
- FINISHER
- PADDER EXTRACTOR

For Pile Fabrics — Woolens — Wool Blends
- ELECTRO-FINISHER
- AUTOMATIC FRAMING MACHINE
- AUTO-FESTOONER
- SHEARER

For Synthetic Fiber Processing
- STAPLER
- FIBER SETTERS
- CRIMPING MACHINES
- TOW PROCESSING MACHINES

For Sweaters
- SWEATER SETTER
- ROTARY DYEING MACHINES

For Dyeing, and Drying
- EXTRACTOR-DRYER
- PACKAGE DYEING MACHINES
- SKEIN DYEING MACHINES
- ROTARY DYEING MACHINES

For Carpets
- CROSS-SHEARER
- FIBER SETTERS

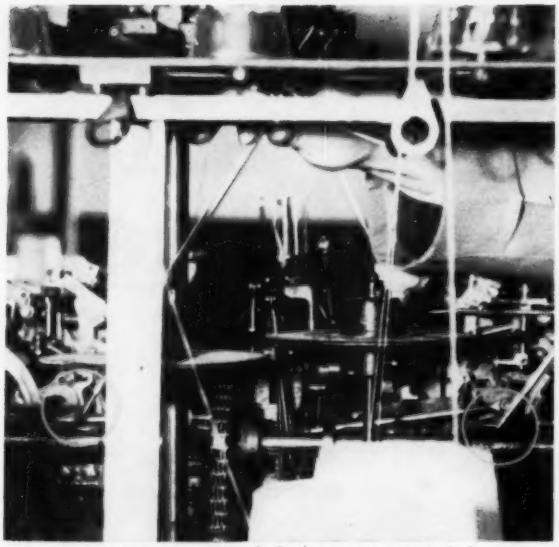
TURBO

In writing for literature please mention the machines in which you are interested

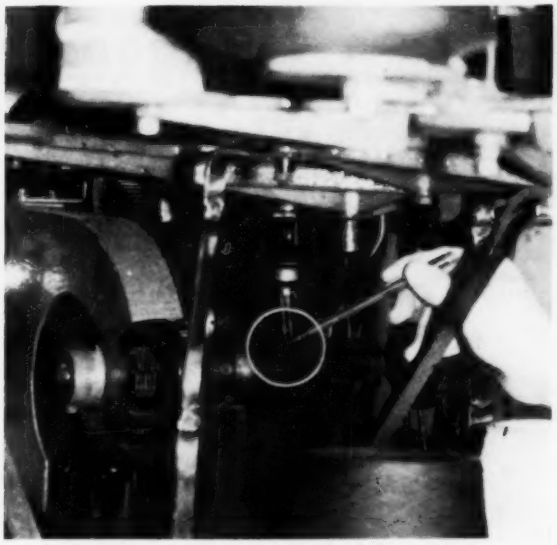
TURBO MACHINE COMPANY, LANSDALE, PA., U. S. A.

Telephone: ULysses 5-5131

For further information use Handy Return Card, Page 191

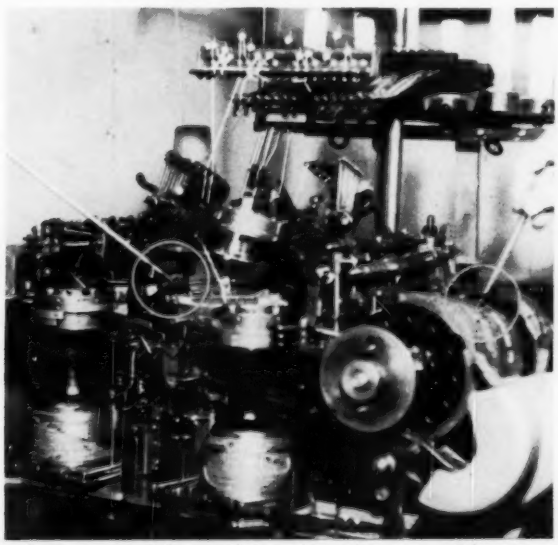


two main bearings supporting shaft that rotates control drums.....



and long bearing supporting chain-driven shaft at the rear.....

Apply needle oil to cylinder and sinker caps every 4 hours.....



and grease control drums and yarn change levers every 8 hours . . .

driven shaft located at the rear of the machine.

6. Apply needle oil lightly to the cylinder and sinker cap every four hours.

7. Every eight hours brush grease lightly onto the rotating control drums and yarn change levers (these actuate the yarn levers).

Although there are other points at which lubrication is important, the seven categories just mentioned are most frequently neglected, and a failure therein is costly in parts, labor, and production. Machinery suppliers include complete lubrication charts in their catalogs issued since 1950, and knitting mill personnel stand to profit by observing them in detail.

LUBRICATION EQUIPMENT NEEDED

1. One oil can with long spout for medium weight oil

2. One oil can with long spout for light needle oil

3. One small open mouth container of grease and one half-inch paint brush

LUBRICANTS NEEDED

1. Medium weight oil (SAE No. 30)

2. Needle oil (for example, mixture containing half SAE No. 30 machine oil and half Vexilla L23 or equivalent)

3. Any good grade of bearing grease

Products Packaged

in UNION CARBIDE VisQueen film

cut cost!

You can run your equipment at high speeds without fear of tears or punctures, with high-strength VISQUEEN polyethylene film. Work stoppages are minimized—you get greater production—and at far less cost in time and labor.

PLASTIC FILMS VISKING COMPANY

Division of UNION CARBIDE Corporation

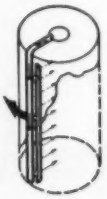
6733 West 65th Street, Chicago 38, Illinois—Dept. TI 8

VISQUEEN film—the original polyethylene film...finest for packaging.

Cleans air cleaner!

Here's why the Model F Aeroturn filter does a better job of lint and dust collection – saves operating dollars, too

1 Lint laden air is exhausted from openers, pickers, nappers, etc., and is collected in fabric filter tubes. Both lint and dust are removed from filter surfaces; only clean air passes through. Model F is the only lint filter to accomplish this automatically with extremely high efficiency.



2 *Dust* accumulations are removed by a unique blow tube. It rotates slowly in contact with the outer filter surface, discharging a jet of high velocity air through the fabric filter.

3 *Lint* accumulations are removed automatically by an adjustable blade rotating inside the fabric filter. Both the blade and the reverse-air jet blow tube function only when lint and dust accumulations necessitate cleaning.

You'll want complete information about the new Model F Aeroturn. It's the only lint filter designed specifically to solve textile mill air cleaning problems. It saves you on initial cost, installation expense, heating and cooling expenses, floor space and clean-up. It can help you improve your product quality. Write: KOPPERS CO., INC., Dust Filter Dept., 4708 Scott Street, Baltimore 3, Maryland.

KOPPERS AEROTURN® LINT FILTERS

Engineered Products Sold with *Service*

you add
quality to
laminated knits
with **TURBO-ORLON***

Outstanding bondability . . .
hand . . . drape . . . crease resistance
. . . lightweight garments with
excellent thermal insulation

Orlon processed by the Turbo-Stapler provides the properties you want for laminated knits. Its uniform fiber distribution and improved spinnability makes a 80/20 ORLON/WOOL blend with excellent cover and fabric breathability.

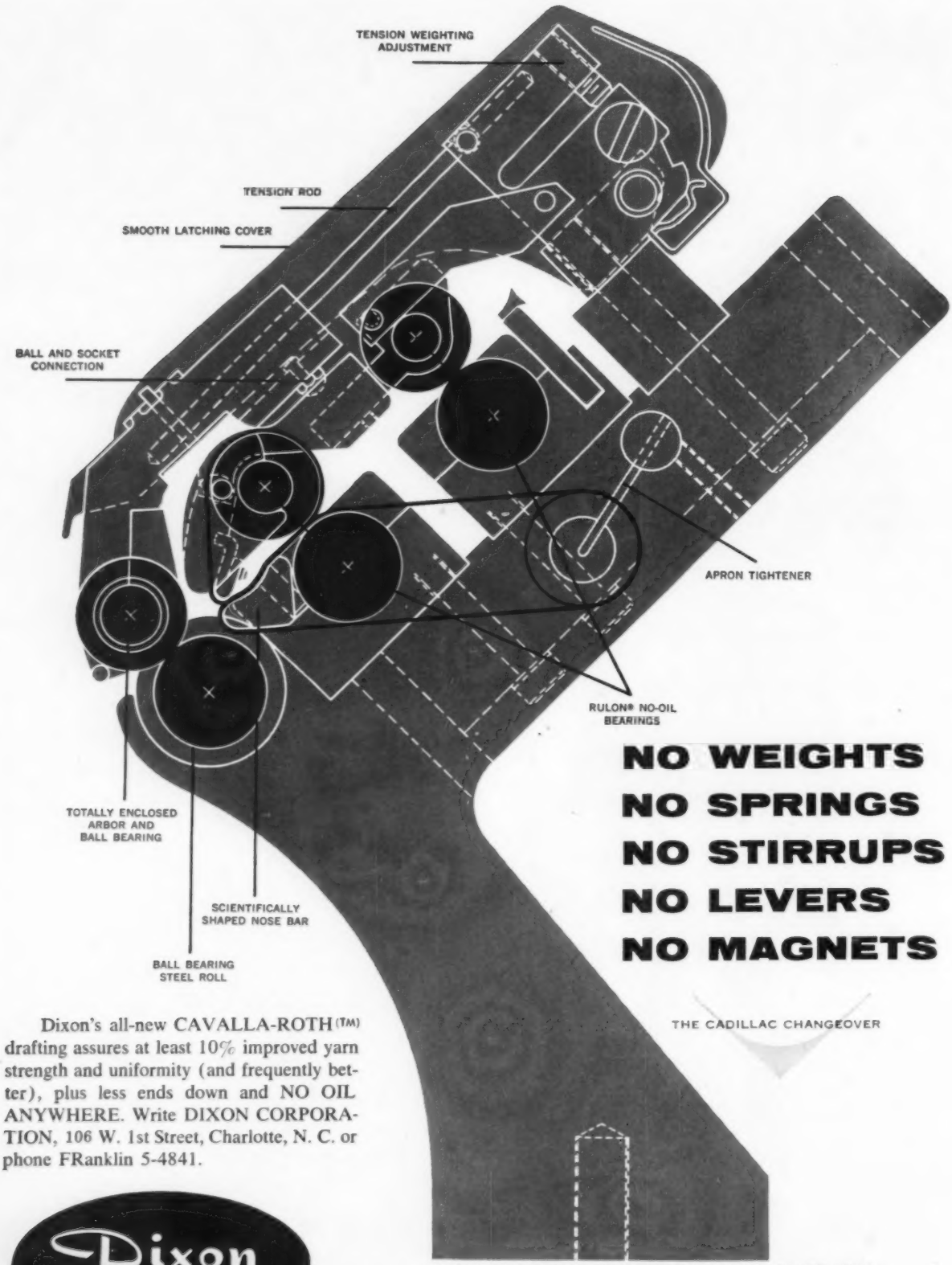
Turbo-Orlon is supplied in high bulk form especially for laminated fabrics. *Let your licensed Turbo spinner show you how Turbo-Orlon can add quality to your laminates.*

*Du Pont Reg. Trademark

TURBO-ORLON

LOHRKE / TURBO

3 PENN CENTER PLAZA • PHILADELPHIA 2, PENNSYLVANIA



NO WEIGHTS
NO SPRINGS
NO STIRRUPS
NO LEVERS
NO MAGNETS

THE CADILLAC CHANGEOVER

Dixon's all-new CAVALLA-ROTH (TM) drafting assures at least 10% improved yarn strength and uniformity (and frequently better), plus less ends down and NO OIL ANYWHERE. Write DIXON CORPORATION, 106 W. 1st Street, Charlotte, N. C. or phone FRanklin 5-4841.

Dixon

ENGINEERED SPINNING CHANGEOVERS SINCE 1876

For further information use Handy Return Card, Page 191

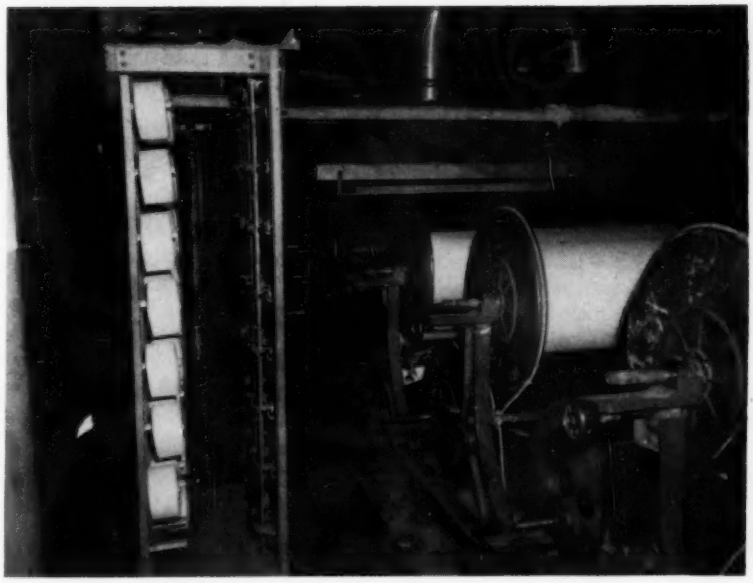
HOW OTHERS MANAGE

Sizes selvage yarns directly from cheeses

THE EDITORS:

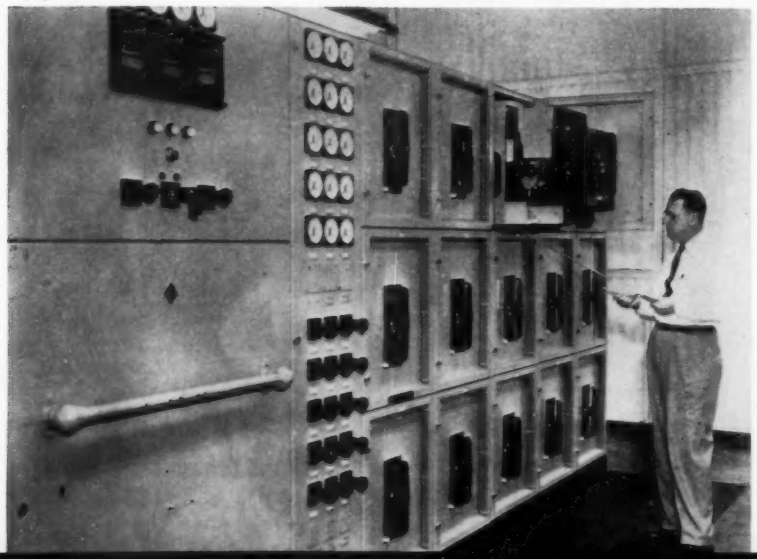
When it is desired to run selvage ends of a count different from the ends in the body of the warp, it will usually be best to run them from a separate section beam or from individual packages. One method is to have a creel to hold spooler cheeses mounted at the side or rear of the slasher creel. The selvage ends are run through a comb mounted behind the slasher size box.

CONTRIBUTOR NO. 1331



How to increase reliability of low-voltage circuit breakers

A sealed, diaphragm-operated timing device used in this Type LA-50 air circuit breaker at Avondale Mills, Pell City, Ala., has increased operating reliability of the electric equipment.



A diaphragm-operated, sealed, timing device has helped increase operating reliability of low-voltage circuit breakers in locations where dust, corrosion, chemical fumes, and other contaminants can adversely affect the functioning of delicate instruments. This is important in textile mills where the atmosphere is laden with lint and chemical fumes from bleaching and dyeing processes. Unless circuit breakers are located in a controlled atmosphere, remote from the manufacturing area, their reliability may suffer.

Time delay devices are used in low-voltage power circuit breakers which break the circuit when

overload occurs. The time delay device has the purpose of delaying power interruption. If the overload is of short duration, power will not be interrupted. Only if the overload persists, power will be interrupted after a predetermined time, controlled by the time delay device. Through the use of long-time and short-time delay elements in combination, it is possible to provide coordination between breakers so that power interruptions can be confined to a single circuit.

To provide maximum reliability in circuit breaker operation—especially in contaminated atmospheres—Allis-Chalmers has developed a hermetically sealed time delay device incorporated in low-voltage power circuit breakers used widely in substation load centers of industrial installations.

This timing device, whose main body measures about 1-¼" by 1-¼" by 1-¾", consists of two inner chambers connected by a porous plug of sintered bronze. The lower chamber is filled with a special silicone oil that will retain its physical properties under greater temperature extremes than any other oil. It gives accurate timing, and is reliable even after long months of inactivity.

When overload occurs, a plunger attached to a diaphragm inside the unit is actuated by the tripping armature of the over current trip device. The diaphragm then slowly forces the oil through the porous plug into the upper chamber. When all the oil is in the upper chamber, the plunger and tripping armature have traveled their full length, and power is then interrupted by the circuit breaker.

One of the key elements that made this unique design of the time delay device possible is the 0.010-gauge diaphragm of Buna-N coated nylon, supplied by the Vulcan Division of Reeves Brothers, Inc.

The diaphragm must combine extreme flexibility with exceptional durability. When overload occurs, oscillation of 120 beats per second are set up that are transferred by the plunger to the diaphragm. A thick diaphragm responding to the resonance frequency will not function, it was found.

Moreover, the reset mechanism is so delicate that only a thin diaphragm is sensitive enough to make the unit function effectively. Finally, the coating of the diaphragm material must remain completely inert to the silicone oil.

Take burrs off F-F sinkers with ink eraser

THE EDITORS:

When 51- and 60-gauge full-fashioned hosiery knitting machines have been in operation for a number of years, sinkers in the knitting heads sometimes acquire a small burr on their tops. This condition shows up as a streak in the stocking.

Often this burr can be removed by opening the needle head and running the sinkers out just enough for a fixer to see it. He can then remove the burr with an ink eraser, which contains sufficient abrasive to remove the burr and polish the remaining metal. It is quickly done, and it often saves replacing the sinker.

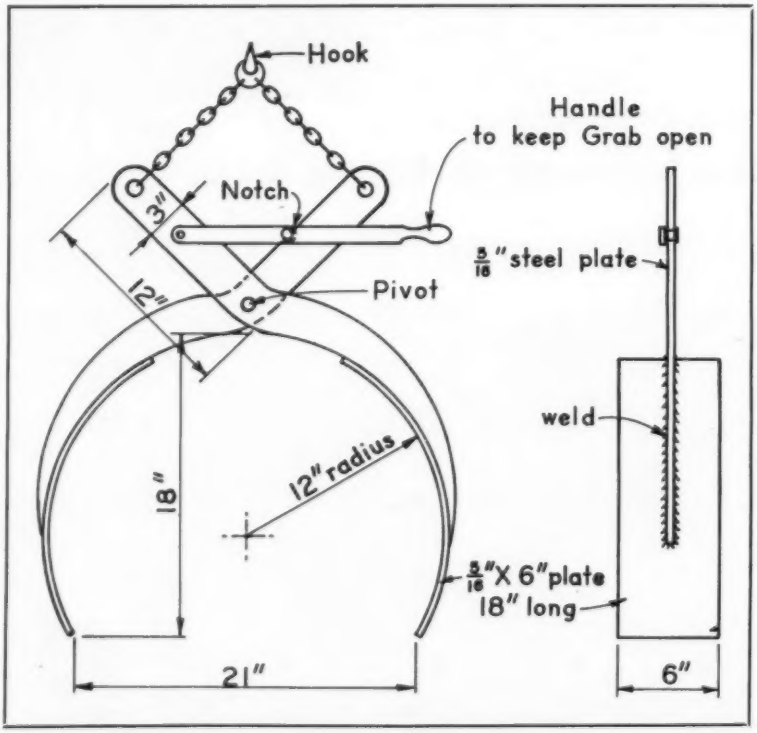
CONTRIBUTOR No. 1277

Way to speed doffing at inspection tables

THE EDITORS:

At our inspection tables we were lifting our cloth rolls with a rope fitted with an eye at each end and with its center fastened to an electrical hoist. The doffer had to pass a steel bar through the center of each roll and hang the eyes on the bar ends. He then could lift the rolls with the hoist—too slow.

We thought of a grab that would take any kind of roll by clamping it about the middle. We made a plywood model, studied it and



made a few alterations. Then we copied it in steel, using 5/16" plate. To enable us to prop open the jaws (see illustration) we pivoted a handle onto one jaw. Near the other end of the handle we fitted a hardened steel stop pin and grooved the other jaw to receive the pin. It is easy to prop open, drop into place around a roll, and collapse there. It has cut ⅓ off our doffing time.

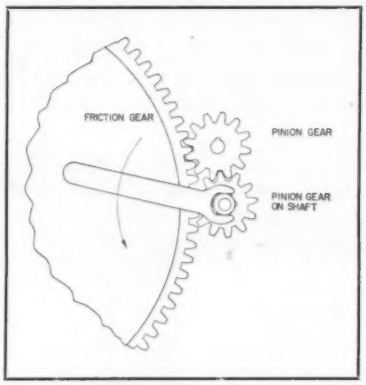
CONTRIBUTOR NO. 1332

How to quickly replace pinion on loom motor

THE EDITORS:

Since the loom motor pinion must be securely attached to the motor shaft, it is sometimes hard to remove the nut when it is necessary to change pinions. An easy way to prevent the pinion and friction gear from turning while the nut is being loosened or tightened, is to place the pinion that is to be exchanged in mesh with the pinion and friction gear. The teeth will then lock and hold securely.

CONTRIBUTOR NO. 1311

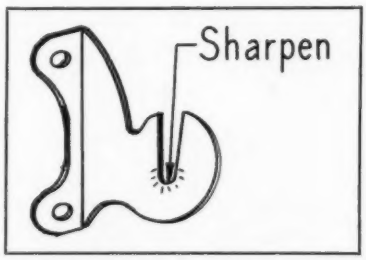


Mill-made twine cutter saves time

THE EDITORS:

Around the knitting plant we often have to cut twine into short lengths for various uses, and often we find we have our hands full at the moment we need the twine. If someone isn't near enough to help, we have to empty our hands and proceed with the cutting.

One of our fixers secured a window shade hanger to the wall near his workbench and filed the bottom of the slot to a sharp edge. So now when he needs to cut twine he flips a loop of it over the hanger (its design makes the twine thread through the groove naturally) and pulls it against the cutting edge. And he can do that with both eyes closed and both hands full, if necessary.



CONTRIBUTOR NO. 1327

WON $100

JOHN UMPHLET of Tarboro, N. C., was the winner of TI's most recent Kink Contest.

There is still time for YOU to win the current contest, but you must hurry . . . it ends August 15.

It's easy to be a contestant. Here's how:

► Mail before Midnight, August 15, 1961, one or more kinks, short-cuts, time-savers, or quality improvement suggestions for textile mill management or operating executives to The Editors, "Textile Industries," 1760 Peachtree Rd., N. W., Atlanta 9, Ga.

All items accepted for publication will be paid for promtly at present space rates. In addition, winner of the contest will receive $100 cash.

Extra payment is made for usable photographs and/or sketches which accompany your entries.

Remember, do not send ideas which have been published previously, and do not send your contest entries to another publication.

THE EDITORS

Another tip for F-F hosiery mill management

THE EDITORS:

Hardened oil, dust, etc., packed into the areas between the comb and the needles whenever we stopped a full-fashioned machine for any length of time, such as for a vacation period. Despite our method of using a solvent and needle oil, troublesome traces of this hardened deposit remained, making it difficult at times to remove needles.

A little trick we have adopted has helped reduce this trouble a great amount. I now run a set of hose on the machine just before shutting it down. After the set is off the machine, I open the knitting heads and apply needle oil on the back of the heads and on top of the needle combs with the combs all closed. Previously we had applied the oil on the front of the head.

CONTRIBUTOR NO. 1287

TERRIFIC!

— and how long will the flexing member last?

Good question. The heart of Para-flex is a tire with synthetic tension members bonded together in rubber—which provides a flexing body that automatically compensates for *all combinations* of misalignment and end float, and absorbs vibration as well!

This amazing coupling has now been used in American industry 4 years. Thousands are in operation — in food processing plants, paper mills, chemical plants, textile mills, everywhere — and in these 4 years, replacements of elements have been negligible.

Dodge Standard Para-flex takes angular misalignment up to 4°, parallel misalignment up to $\frac{1}{8}$" and end float up to $\frac{5}{16}$" depending upon the size of the coupling and the duration of shaft displacement.

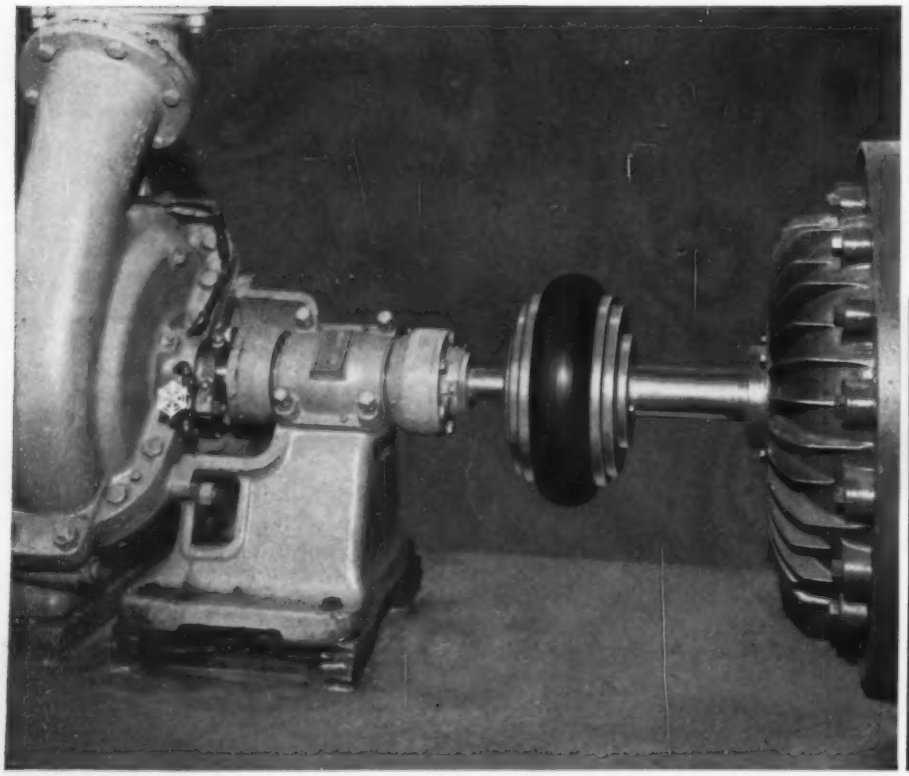
Dodge Para-flex is available in 3 types—Standard, Flywheel and High Speed (shown at right). The Standard type is stocked in capacities up to 3640 hp at 910 rpm. Ask your Dodge Distributor, or write us for complete technical bulletin.

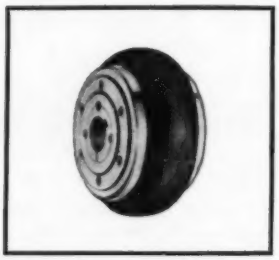
Dodge Manufacturing Corporation, 3500 Union Street, Mishawaka, Indiana

The Products with the Pluses...

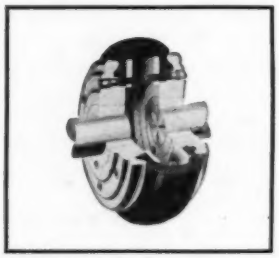
DODGE

of Mishawaka, Ind.

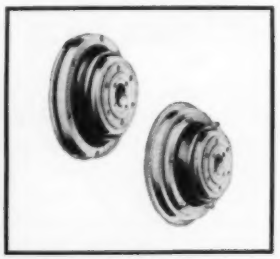




The new idea in flexible cushion couplings, with a flexing member that "swallows up" misalignment.



No lubrication, no maintenance. Replace flexing element without moving driver or driven machine.



Flywheel and High Speed Types. For use with motors and internal combustion engines turning up to 5230 rpm.

DODGE

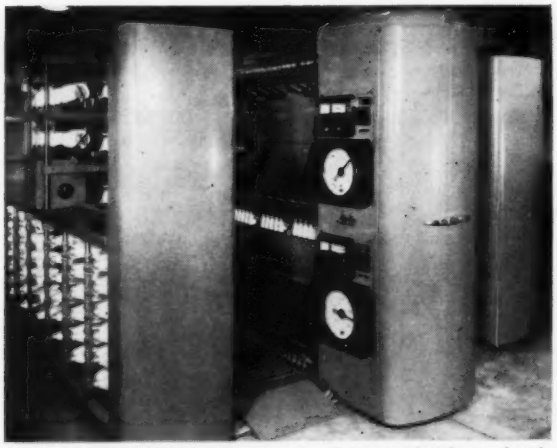
Para-flex

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge he can give you valuable assistance on new cost-saving methods.

For further information use Handy Return Card, Page 191

NEW PRODUCT PARADE

Please note: Claims made in all of these announcements of new developments are of necessity based upon information furnished by the respective suppliers.—The Editors.



A separate yarn supply and take up creel is provided for each side of the Whitin-ARCT textured yarn machine, as shown here. Yarn delivery from creel to frame is through a self-threading platform, and take-up of processed yarn is over the work aisle from the top of the processing machine. Supply pirns can be magazined for continuous operation, and the take-up package accommodates 4½ lb of processed yarn.

Twister makes stretch yarns of higher quality

The Whitin-ARCT Type FTF Machine processes thermoplastic-type yarns continuously through a series of precise mechanically and thermally controlled conditions to produce textured yarns that are distinguished by their crimped high bulk and low torque characteristics. Built by Ateliers Roannais de Constructions Textiles (ARCT) of Roanne, France, and sold and serviced in the United States, Canada, and Mexico by Whitin, the FTF (false twist-fixed) machine makes stabilized textured yarns which can be tailored to the requirements of knitting and weaving mills with complete assurance of uniform dye level.

The first of two stages, in this continuous operation, produces a false twist type yarn which is modified in the second stage by influencing the linear speed of the yarn in the second thermal treatment. The first and second overfeeds, the temperatures in both thermal treatments, and the twist factor can all be varied in precisely controlled combination to produce an infinite variety of yarn characteristics.

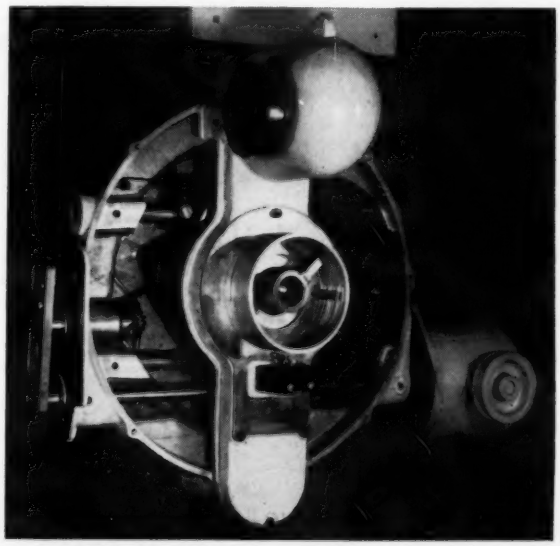
The standard production frame has 216 ball bearing spindles which operate at 72,000 rpm. A 72-spindle unit is available for research and development. The false twist and post twist stages have individual temperature and safety control instruments; temperatures are maintained within plus or minus 1 C in each heat zone, spindle to spindle, of the entire machine. Temperature controls permit work in two heat ranges: 176 F to 302 F and 302 F to 482 F. Overfeed possibilities in the second heat are in excess of 30 per cent.

Whitin Machine Works, Whitinsville, Mass.

Do you want more data? Write ◂ or use card on page 191; list H-101

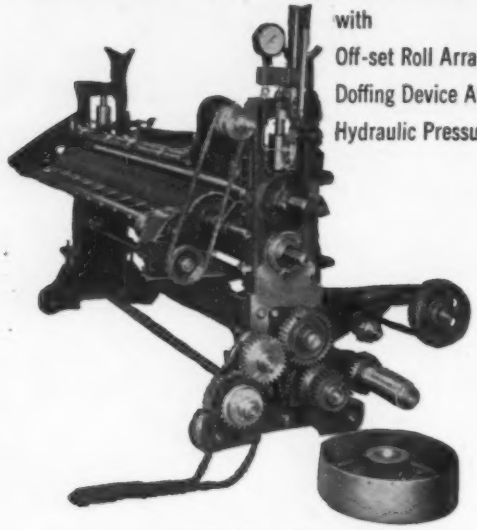
Builds tip bunch on warp and filling bobbins

The tip bunch automatically produced on yarn packages by the Bild-O-Matic builder motion for warp and filling spinning frames (1) enables mills to use direct spun filling on looms equipped with automatic filling magazines, (2) speeds up manual filling of conventional batteries as yarn ends are always in same location, and (3) makes practical automatic mechanical end pickup in



The Bild-O-Matic spinning frame builder motion with housing removed to show working parts.

NEW "LIGHTWEIGHT" PERALTA® MACHINE



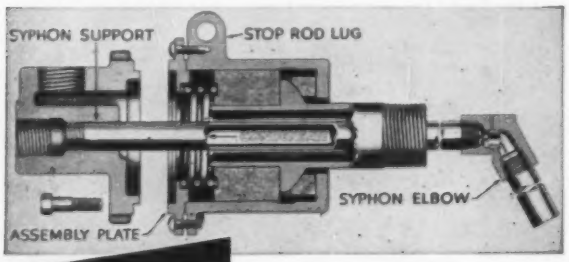
with
Off-set Roll Arrangement
Doffing Device Attachment
Hydraulic Pressure

Write for information.

Duesberg-Bosson of America, Inc.
Main Street Jefferson, Mass. P.O. Box 25

TRY THIS on your Dry Cans and 30" Slasher Cylinders

We'll gladly furnish a pair of these units for 90-day obligation-free trial in your mill. The Type SB2P is self-supporting, completely packless, needs no lubrication or adjustment. The Johnson Syphon Elbow permits the use of two straight pipes instead of an unwieldy curved syphon pipe, is hinged to pass right through the joint.



Johnson ROTARY PRESSURE Joints
First in the Textile Industry

Write for Catalog S-3002

Shows self-supporting Johnson Joints for all needs . . . on print cans, calenders, compressive shrinkage ranges, big 5' and 7' cotton slashers, dry cans, etc.

THE JOHNSON CORPORATION
815 Wood St., Three Rivers, Mich.

the spooling process. Number of wraps on the tip may be preset as required.

This self-contained builder motion also automatically lowers the ring rail and stops the frame in doff position, insuring consistent yardage on bobbins from frame to frame and preventing over-runs or short doffs. It can be set to give 1½ to 10 locking wraps as the rail goes down.

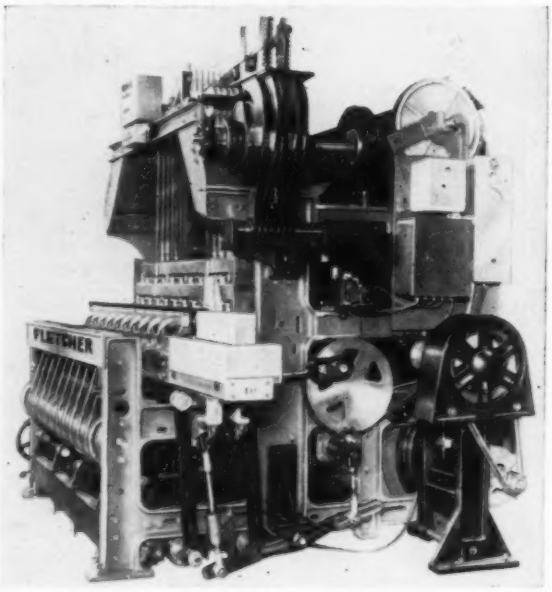
Filling, warp, or combination builds may be obtained with the automatic builder. On filling frames the feeler bunch yardage is preset and therefore consistent from doff to doff, and the body of packages is built with straight sides (same diameter top and bottom) regardless of taper of bobbin itself.

The precision construction of the unit, which has its own drive motor, eliminates backlash from worn parts in head end, insures minimum power requirement, eliminates necessity for manual rewinding of builder, makes adjustment when changing yarn counts very easy, and requires little maintenance.

Southern Machinery Co., P. O. Box 3217, Sta. A, Greenville, S. C.

Do you want more data? Write ◂ or use card on page 191; list H-102

How to make auto safety belts economically

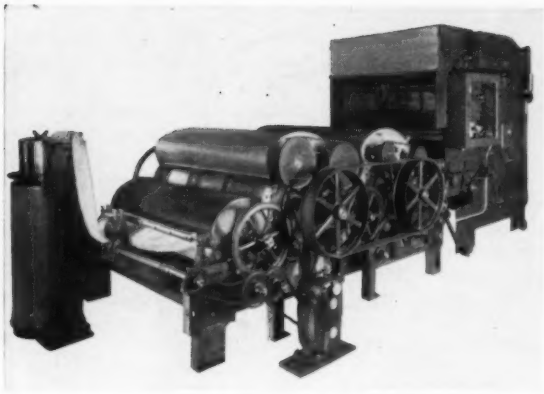


A fully automatic loom made specifically for the weaving of nylon automobile seat belts keeps production costs at a minimum because it weaves at a rate of 250 ppm, producing a continuous belt of strong, high quality nylon fabric. Designated the Fletcher Nylon Auto Seat Belt Loom, it has a warp stop motion and a predetermined pick counter. Warp yarn can be delivered from beams or individual end creels.

A companion machine, a twister, is designed specifically for twisting the warp and filling yarn to specification. The large twister bobbin can be mounted on the warping creel or individually on the loom creel. The bobbin sizes are up to 6" in diameter and 10" traverse.

Fletcher Industries, Inc., Hasbrook Ave. and Beecher St., Cheltenham, Pa.

Do you want more data? Write ◂ or use card on page 191; list H-103



"Compact" wool-type card has many applications

An all-metallic, two-cylinder carding machine now on the market is only 19' 6" long and 10' 6" wide (including the automatic feeder) and weighs only about 15,000 lb. Adaptable to a variety of natural and man-made fibers, this "Compact" Card, as it is known, is being used to (1) make sliver for high pile fabric knitting machines, (2) make sliver for worsted type carpet yarns, (3) precard stock for conventional woolen cards, and (4) produce webs for nonwoven fabrics.

The versatile machine is flexible in basic design and organization to meet application requirements. 24" x 60" cylinders are clothed with metallic wire of the type recommended for the stock to be processed. Chain drives are utilized for the aluminum tube workers, strippers, lickers-in, and lumpers. Among optional features available are: variable speed drive for main drive, feed rolls, and doffer; balling head; can coiler (20" x 42" can); front or side draw; and center draw feed between cylinders.

Davis & Furber Machine Co., North Andover, Mass.

Do you want more data? Write ◂ or use card on page 191; list H-104

High modulus industrial yarn

A new high-tenacity rayon yarn has been engineered for end uses where high modulus, negligible wet or thermal shrinkage, and high strength are required. Called "Suprenka Hi Mod," the yarn provides excellent stability during processing because of its low shrinkage when heated or when moistened, and in use the yarn has low growth under load. Among end uses anticipated for this yarn are V-belts, conveyor belts, ducks, radiator hose, carpets, and tapes.

American Enka Corp., Enka, N. C.

Do you want more data? Write ◂ or use card on page 191; list H-105

Model E wool spinning frames can be modernized

Mills with Whitin Model E wool spinning frames can now update them by (1) eliminating the balancing cylinder drive, (2) increasing traverse from 11" to 16" with a reciprocating motion, and (3) installing antifriction spindles and hand-operated brakes. With the simplified spindle drive less lint and fly accumulate under the frame and maintenance of taping arrangement is easier. From 50 to 100% more yarn can be placed on

Here's a new concept in cationic softeners ... a "cat" that exhausts evenly in package, jig, pad, or bath ... has extremely low particle size for complete penetration ... is non-yellowing on the most difficult applications ... and costs less to use.

Aquazine 100 gives a smooth silky hand and excellent drape to cottons, wools, synthetics and blends ..... delivers the "plus" benefits that please your customers.

Didn't realize they still make miracles? Just ask your Moretex Man for details and samples of Aquazine 100, the "way out" cationic softener.

*Trademark for hydrazine based softener produced by Moretex under basic patents of W. R. Grace Co.

MORETEX
CHEMICAL PRODUCTS, INC.

314 W. Henry Street Spartanburg, S. C.

Manufacturing Chemists for a half century of Textile Progress

BE SURE YOU SPECIFY—
ON YOUR NEW FRAMES PNEUMAFIL®

Only PNEUMAFIL
gives you exclusive "air flow" suction to "swallow" more air, capture more lint, enable faster front roll speeds. Special ring diffusor fan gives widest range of operation at peak efficiency. Choice of three discharge arrangements.

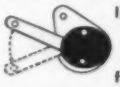
plus

DELTAFLUTE

A powerful new "lap fighter." Unique shape allows closer flute positioning under front roll. Shorter, wider orifice concentrates air stream at point of maximum lint generation for remarkably good cleaning.

plus

DUFLEX suspension



Instant and effortless two-position suspension of flutes permits operator to work around rolls with both hands. Eliminates danger of scratched orifices which cause lint accumulation.

PNEUMAFIL CORPORATION • CHARLOTTE 8, N. C.

KLUTTZ

Lubri-Cased Rings*

WON'T RUST
PIT
OR CORRODE

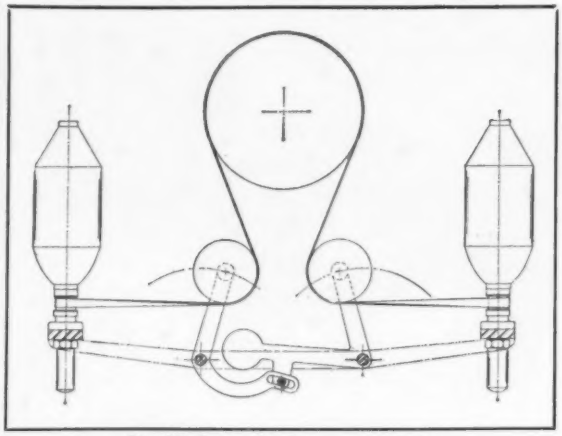
The second side of every Kluttz Lubri-Cased Ring is in perfect condition when you are ready to turn it — because Kluttz Lubricasing has protected it against moisture and corrosive elements. Full double service, plus full speed break-ins, higher spindle speeds, and longer traveler life make Kluttz Lubri-Cased Rings your most efficient and economical spinning rings.

Over 3,000,000 now in service. Write for samples and prices.

*Trade Name — Patented

Representatives: Thomas H. Watson, Maiden, N. C.; Hugh K. Smith, West Point, Ga.; L. D. Talley, Mexia, Texas
For New England & Canada: Textile Parts, Taunton, Mass.

KLUTTZ RINGS, Inc.
Gastonia, North Carolina



Simplified spindle drive arrangement.

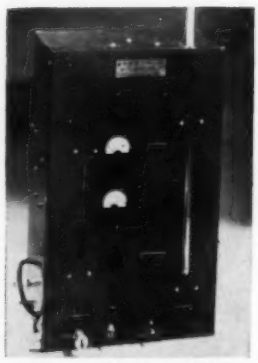
bobbins as a result of the longer traverse. Increase in operating speeds of up to 20% is possible with antifriction spindles.

Other improvements available are: improved twister head drive; individual pulley drives for each tape; balloon control rings; variable speed motor drive; automatic ring lubrication; "Pneumafil" waste removal attachment.

Whitin Machine Works, Whitinsville, Mass.

Do you want more data? Write ◂ or use card on page 191; list H-106

Controls peroxide concentration in bleach liquor



A new aid for the peroxide bleaching process is the GFB Hydrogen Peroxide Concentration Controller A.1 which detects, instantaneously indicates, and automatically maintains a preselected concentration range of hydrogen peroxide. Any variation outside this tolerance range is used immediately, through electrochemical means and suitable circuitry, to adjust the peroxide supply to the correct pre-set value. Sensitivity of the compact and easily calibrated instrument is 0.0001 per cent, operating cost is low, maintenance is negligible, and concentration range is easily adjustable.

G. F. Bush Associates, Box 175, Princeton, N. J.

Do you want more data? Write ◂ or use card on page 191; list H-107

Zero-twist nylon yarn can be woven as is

Rotoset yarn of Type 285 nylon is a zero-twist multifilament yarn that can be woven without twist as either warp or filling into many types of apparel fabrics. As twisting is unnecessary, processing cost is lowered. Other advantages of this new yarn over conventional nylon yarns (such as Type 200) are: (1) improved resistance to the deteriorating effects of light; (2) drastically reduced retractive forces in the yarn on the shipping

package, with the result that pirn taper barré is eliminated and that quill junctions, quill barré, and tight picks are significantly reduced; (3) considerably lower boil-off shrinkage of the yarn which results in greater and more uniform fabric width after wet finishing; (4) greater convenience due to use of a disposable core tube-type package that holds more yarn and provides lower, more uniform, yarn delivery tension.

For fabrics requiring the use of twisted yarn to achieve a particular style or appearance, this new yarn may be readily twisted by conventional methods. Twist levels can be reduced to the minimum needed to achieve the particular effect desired. Another benefit of twisted Rotoset yarn is improved uniformity of fabric appearance.

E. I. du Pont de Nemours & Co., Inc., Textile Fibers Dept., Wilmington 98, Del.

Do you want more data? Write ◆ or use card on page 191; list H-108

Two more applications for Unifil

Cotton looms on which 8¾" quills are being used may now be equipped with the Unifil Loom Winder. A new unit engineered specifically for this purpose winds quills up to 8¾" long and 1½" in diameter. Filling yarn as heavy as 1.25 (cotton count) can be processed on the device.

C & K S-6 looms running single filling yarn may also be equipped with Unifil as the result of a recent modification to the apparatus.

Leesona Corp., P. O. Box 6088, Providence 4, R. I.

Do you want more data? Write ◆ or use card on page 191; list H-109

Improves quality of toe seaming operation

The Paraseam controlled contour seaming attachment for use on seaming machines for the toes of ladies' Getaz toe seamless stockings enables operators to obtain top quality production. The toe seam is repeated exactly each time because it is guided by a rotating template. Thus, pairing is made easier through insured uniformity and quality.

Operation requires only placing of stocking on template which is lined with plush to prevent slipping.

Paramount Textile Machinery Co., 131 S. Wabash Ave., Chicago 3, Ill.

Do you want more data? Write ◆ or use card on page 191; list H-110

DID YOU KNOW WE SERVICE 5 STATES?

Virginia, North & South Carolina, Georgia & Tennessee

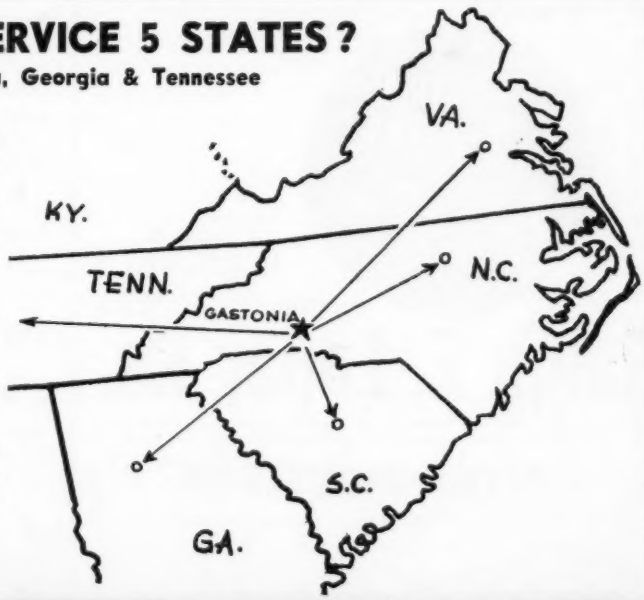
JENKINS Metal Shops trucks roll into these five states every week on scheduled runs to service their good clients with prompt and personal service.

Wouldn't you like to be included on the scheduled run through your state? You can . . . just drop us a line. We will pick-up and deliver and assist you in many ways.

We have representatives in New England and other Textile centers . . . also in Canada.

Our trained personnel will gladly explain our services and facilities. JENKINS Metal Products are numerous and are quality proven by years of service.

IN OUR 49th YEAR OF SERVICE



SINCE 1912 JENKINS METAL SHOPS INCORPORATED ENGINEERED PRODUCTS

JENKINS METAL SHOPS, Inc.

P. O. BOX 1160

GASTONIA, NORTH CAROLINA

DRONSFIELDS' PATENT
ATLAS BRAND
EMERY FILLET

U.S.A. Patent
2426441

STOCKED BY
THE PRINCIPAL MILL SUPPLY HOUSES
AND CARD MAKERS

INDUSTRIAL ENGINEERS
- MODERNIZATION PROGRAMS
- PLANT LAYOUTS
- COST SYSTEMS
- COST REDUCTION REPORTS
- WORK LOAD STUDIES
- MANAGEMENT PROBLEMS
- SPECIAL REPORTS

GREENVILLE, S. C.
Dial CEdar 2-3868
FALL RIVER, MASS.
Dial OSborne 6-8261

SPECIALIZING IN TEXTILES SINCE 1914

Ralph E. Loper Co.

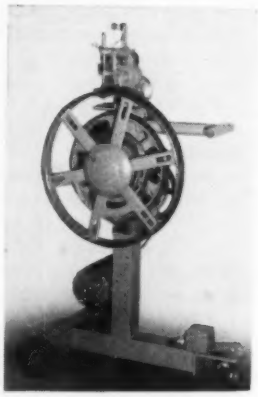
TEXTILE INDUSTRIES

FIRST IN:

- READERSHIP
- MILL CIRCULATION
- EDITORIAL PAGES
- ADVERTISING PAGES

(Use Postage Paid Card—Page 191)

Mill sewing machine speeds grey goods seaming



A faster single thread, chain stitch, piece end, portable mill sewing machine has been announced. Designated the BB999, it is an addition to the "Flightweight" line of mill sewing machines and features: a rugged gear-driven head with a minimum of moving parts; an all-welded, lightweight, easily-maneuverable stand; rubber wheels; and automatically retracting feed wheel pins for positive stripping.

Birch Brothers, Inc., 32 Kent St., Somerville 43, Mass.

Do you want more data? Write ◂ or use card on page 191; list H-111

Jacquard knitter pattern card sealing service

A fast, reliable pattern card sealing service is available for those knitting mills which produce their own Mylar pattern cards for Wildman Jacquard circular knitting machines. Sealing is done by a recently developed method which utilizes ultrasonic equipment to produce a neat, clean, and troublefree seam.

Other services available to customers of Wildman Jacquard are: (1) consulting and training service for customers who prefer to do their own styling and design work; (2) furnishing complete pattern card sets from sample fabrics, garments, or photographs provided; (3) punching master pattern cards and duplicates from customer's graph paper layouts; and (4) pattern duplicating service from customer's master cards.

Wildman Jacquard Co., 1210 Stanbridge St., Norristown, Pa.

Do you want more data? Write ◂ or use card on page 191; list H-112

Unit detects length and diameter defects in yarn

A new, modular warp yarn inspector offers, in a single instrument, complete protection against objectionable defects of both length and diameter. Known as the Mark III Warp Yarn Monitor, the photoelectric apparatus (1)

Depending on the user's needs, two, three, or four electronic modules may be included in the compact monitor housing. This one has three.

counts defects, (2) stops the warper for their removal, (3) detects end breaks, and (4) detects length changes. The modular design makes the equipment unusually versatile, flexible, and compact while retaining the dependability and economy of earlier models.

Fabrionics Corp., Box 521, Huntington, N. Y.

Do you want more data? Write ◂ or use card on page 191; list H-113

Machines automatically apply rayon strapping

Two automatic strapping machines for applying "Avistrap" Cord Strapping are available. Model AVM-1 Avistrapper accommodates packages between a minimum size of 6" x 6" (or any periphery not less than 24") and a maximum size of 20" x 20". The Model AVM-2 Avistrapper straps packages in a range of from 15" x 15" and 36" x 36". Both accommodate packages of any length, operate without machine adjustment, and use any width of Avistrap from ¼" to ¾".

American Viscose Corp., Industrial Packaging Dept., 1617 Pennsylvania Blvd., Philadelphia 3, Pa.

Do you want more data? Write ◂ or use card on page 191; list H-114

Open width finisher for tubular knitted goods

Relaxed spreading and steaming of tubular knitted goods, combined with controlled slitting, opening, and packaging, are provided by the Tube-Tex Open Width Finishing Machine. Goods up to 80" wide when open may be processed on the machine which either rolls finished fabric or folds it out.

Tubular Textile Machinery Corp., 33-61 54th St., Woodside 77, N. Y.

Do you want more data? Write ◂ or use card on page 191; list H-115

Less paper work *(from page 149)*

Working with the methods men of the Ormig Division of Copy-Craft, Inc., Pyramid's president, Eli Cohen, and Systems Engineer Lawrence King developed the program that, through a 12-month shakedown cruise, has met all tests. It allows Pyramid to get those finished orders out of the house on time; gives the shop a chance to produce (output has increased); and, equally important, it is economical.

How It Works. Basis of the new system is an Ormig electronic selective spirit duplicator with unlimited selective ability. Now, all data required to process an order — no matter how complex — are written just once on a single master. The machine creates all necessary papers and directives from this master. See *Figure 1.*

As soon as an order is received, all data relevant to the processing of that order are entered on the master. These data include quantity ordered, style and description on one side, and internal instructions for the shop on the other side. Information for the shop only may also be shown in the main, or left hand section of the master, in the space directly below one or more items, as required. Several full page copies — known as shop order forms — are run off for shop use. The master is then filed.

When the shop has completed part of an order that can be shipped to a customer, all the information the shop needs on order status, and an invoice for this partial shipment — along with contents memorandum and packing slip — are prepared from the original master. No rewriting, no transcription is necessary.

The operator merely takes the master from the file and clamps it into the machine; pushes the proper buttons, and the machine picks up the lines corresponding to the items on which shipments have been made, bringing these together in condensed form on the invoice.

The information for shop use only is eliminated by failing to depress the corresponding buttons. All needed copies of the invoice are then run off.

In similar fashion, the other documents necessary for processing the order — contents memoranda, packing slips, shop orders— showing only the information required on each, are also prepared, as well as acknowledgment of receipt of order forms to be sent to the customer, and production control copy.

Single item tickets may also be produced from the original master, for sales analysis and compiling statistics for use in anticipating future production requirements. All data on the one complete order are thus centered in the one machine.

The unlimited selective ability of the machine enables the operator to combine heading (addresses, shipping instructions, etc.) with items from anywhere on the master, and bring this data together on the master. As a full page copy of the master is placed on the visible control panel, with one button corresponding to each line or item on the master, the operator needs no special training. A further visual check is provided, as an indicator light appears next to each line that has been reproduced.

Instead of pencilling out manufacturing directives and sending marked and unclear papers to the shop, the new system provides the shop with current manufacturing directives after each partial shipment. In this way, the shop always has clearly printed orders on the work immediately in hand. It receives orders only on what it has to do.

The single master system has reduced paper work and filing, eliminated re-writing and transcription, with the inherent possibility of error, cut clerical time and costs, and provided the shop with clear-cut manufacturing orders. Most of all, it enables Pyramid to get the full benefit of its modern and unique manufacturing methods by providing management with a way of getting orders and invoices out as soon as a partial shipment is completed. The paper-work backlog is eliminated, and the customer gets his merchandise when he wants it.

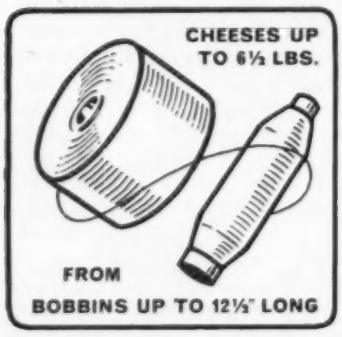
NEW AUTOMATIC SPOOLER

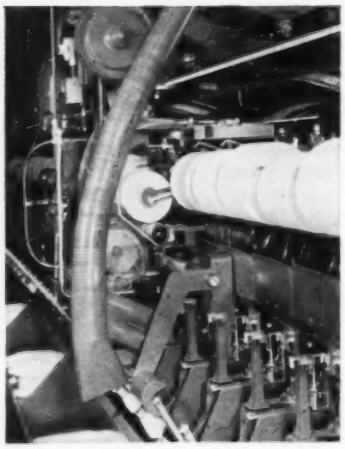
TYPE "F"

BARBER COLMAN

DESIGNED FOR MODERN SPOOLING FROM LARGE BOBBINS TO LARGE CHEESES

The best features of preceding machines have here been combined with many modern improvements to produce this latest and greatest of Barber-Colman Automatic Spoolers. Increased capacity permits spooling of cheeses up to 6½ lbs. from bobbins up to 12¼" long. Bobbin pockets with movable skewers are lengthened and improved. Permanently-balanced bakelite drums have new crossover double grooves. Quick-set snick plates, one of the finest yarn cleaners ever developed, are easily accessible. Double cheese-supporting arms have built-in brakes. A radical new feature is an automatic sorter that separates empties from tailings bobbins, eliminating any further handling of bobbins after placing them in the pockets. Another valuable innovation is a tape-breaker mechanism, a simple device that greatly improves the build of the cheese. By using the 6½ lb. cheese, production improvements can be achieved in warping, doubling, twisting, backwinding, sale cones, knitting, unifil, shuttleless looms, or quillers. *For full information on how this new Spooler can benefit you, see your Barber-Colman representative.*





Above, a close-up view of traveler moving along the cheese row, picking up the ends from the bobbins and tying them to the cheeses.

"EVERY KNOT A TRUE WEAVER'S KNOT"

AUTOMATIC SPOOLERS • SUPER-SPEED WARPERS • WARP TYING MACHINES • WARP DRAWING MACHINES

BARBER-COLMAN COMPANY

ROCKFORD • ILLINOIS • U. S. A.

FRAMINGHAM, MASS., U. S. A. | GREENVILLE, S. C., U.S.A. | MANCHESTER, ENGLAND | MUNICH, GERMANY

INDIA	MEXICO	BRAZIL	JAPAN	PAKISTAN	PAKISTAN
Batliboi & Company Forbes Street, Fort Bombay, India	J. Rabasa Isabel la Católica 45-913 Apartado 7348 Mexico D.F., Mexico	Industria e Comercio de Maquinas S. A. "COMASA" R. Glicerio, 537/547 Sao Paulo, Brazil	Do-Yei Shoji Kabushiki Kaisha Atlas Building (7th Floor) 11, Bingo-Machi, 3-Chome, Higashi-Ku Osaka, Japan	Associated Agencies (M'cr.) Ltd. Piccadilly House 11 Piccadilly Manchester 1, England	Associated Agencies (M'cr) Ltd. 730, Muhammadi House McLeod Road Karachi 2, Pakistan

For further information use Handy Return Card, Page 191

HERE'S PROOF THAT DU PONT IMRON(TM) CUTS FLOOR MAINTENANCE COSTS

Ruinous combinations of oil and grime, heavy traffic and high humidity played havoc with floor maintenance costs at Chatham Manufacturing Company, Elkin, N. C.—until all six acres of wood floors were refinished with IMRON. Now, the company reports, floors resist scuffing, abrasion and moisture, retain a high gloss and shed lint far better than ever before. Moreover, in-plant tests (above) show a much longer life expectancy for IMRON than for regular finishes! As a result, their floor maintenance costs have been reduced to a minimum.

IMRON regularly outlasts conventional varnishes of good quality a minimum of 2 to 3 times over. A single-package, oil-free urethane clear, it possesses wearability and protective characteristics not found in Alkyd, Phenolic or Epoxy floor varnishes. Almost colorless when applied, it *stays* light and pale. And you can apply the first coat on an off-day morning, the second coat that afternoon, let full traffic back on by midnight! For complete information, clip and mail the coupon *today*.

E. I. du Pont de Nemours & Co. (Inc.)
Finishes Division, Department TI-18
Wilmington 98, Delaware

Please send me, without obligation, fact-filled technical bulletin on IMRON.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

DU PONT REG. U. S. PAT. OFF.

IMRON(TM)
TEXTILE FLOOR FINISH

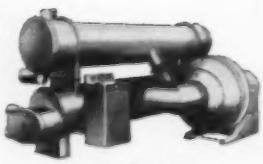
Better Things for Better Living . . . *through Chemistry*

From 5 to 5000 tons...

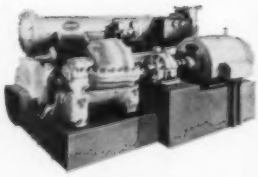
CARRIER OFFERS BALANCED REFRIGERATION SYSTEMS

for any air conditioning or process cooling job

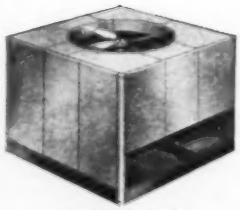
Automatic Absorption Refrigeration Machines
Capacities: 50 to 1000 tons



Hermetic Centrifugal Liquid Chilling Packages
Capacities: 100 to 2000 tons



Centrifugal Refrigeration Machines
Capacities: 100 to 5000 tons



Induced Draft Cooling Towers
Capacities: 170 tons and up

For further information use Handy Return Card, Page 191

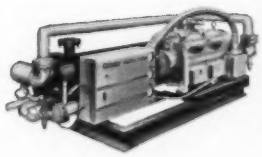
ADVANTAGES:

- **Combined ratings simplify system design**
- **Undivided responsibility for entire package**
- **All components matched and full rated capacity**
- **Lower over-all owning and operating costs**

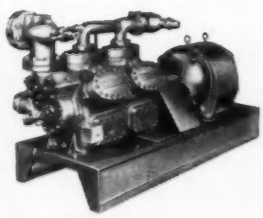
Designed to complement each other, Carrier offers a complete line of matching components—refrigeration machines, condensers and cooling towers—to accommodate the requirements of any commercial or industrial application. But the completeness of the Carrier line is not nearly so significant as the advantages that result from your making full use of it—simplified selection and design . . . dealings from job's start to finish with one responsible source for all components . . . and finally, a balanced system that assures your customer of maximum efficiency with minimum owning and operating cost.

The reliability of Carrier refrigeration equipment has been proven on thousands of jobs, small and large, all over the world. Some of this equipment is shown here. For complete information . . . or information about components for a specific job . . . call your Carrier representative. Or write Carrier Air Conditioning Company, Syracuse 1, New York. In Canada: Carrier Air Conditioning Ltd., Toronto 14.

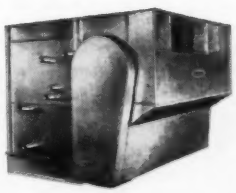
Carrier ***Air Conditioning Company***



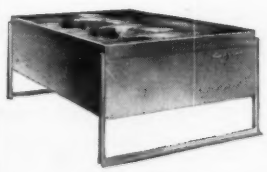
Liquid Chilling Packages
Capacities: 15 to 125 tons



Reciprocating Compressors
Capacities: 5 to 250 tons

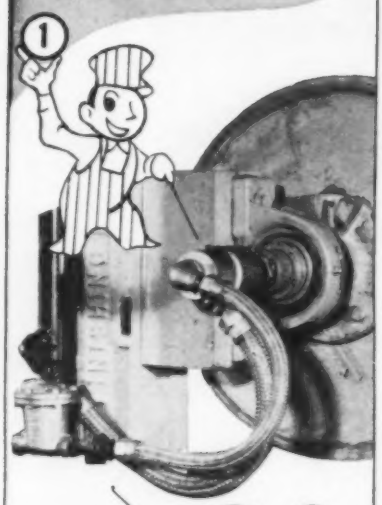


Evaporative Condensers
Capacities: 10 to 250 tons



Air-cooled Condensers
Capacities: 5 tons and up

How TO PREVENT OVER or UNDER DRIED Warps and Cloth



PSC

This combination delivers your predetermined amount of steam to slashers, dry cans, embossers, etc. without loss or fluctuation and thereby eliminates one cause of over or under dried places in warps and cloth.

① **THE ROTARY UNION*** is the finest precision mechanical seal ever offered for revolving equipment. Heavy Monel bellows automatically maintain equal pressure at all points against an optically flat sealing face, regardless of machine or unit wear. Unique syphon construction assures maximum removal of condensate from cylinders.

② **THE UNITRAP®** is the only steam trap which *automatically* delivers peak efficiency at all pressures from 0 to 125 lbs. without adjustments or orifice changes. Its exclusive Dual-Valve* insures rapid discharge of condensate without loss of steam or heat.

This combination will give you better results at lower costs. For full information, write for Bulletins 700 and 800.

*Trade Name—Patented

"WHERE *Good Connections* COUNT"®

PERFECTING SERVICE CO.

332 Atando Ave. Charlotte 6, N. C.

Baltimore, Buffalo, Chicago, Cleveland, Camden, Los Angeles
New York, Providence, Montreal, Toronto, Canada

BOOKLETS

raw stock to roving

T-101 LUMMUS PEPPER - SHAKER OPENER. Gives complete details and photographs. Aldrich Machine Works, P. O. Box 750, Atlanta, Ga.

T-102 STATIC ELIMINATION. How to eliminate static safely and inexpensively. Simco Co., 920 Walnut St., Lansdale, Pa.

T-105 VERSA - MATIC DRAWING FRAME. Describes drafting elements, quality of sliver, roving and yarn possible. Saco-Lowell Shops, Textile Machinery Div., Easley, S. C.

T-106 SARGENT OPENER. Describes opener with rotary evener and stripper. C. G. Sargent's Sons Corp., Graniteville, Mass.

T-107 FEATHERTOUCH DRAFTING. How to get "highest production per frame at lowest cost." Ideal Industries, Inc., Bessemer City, N. C.

T-112 ADVANTAGES OF ALDRICH PICKERS. Good technical text, comprehensive pictures. Aldrich Machine Works, P. O. Box 750, Atlanta, Ga.

T-113 NEW CONDENSER TAPE. Describes Supr-O-Tape, an impregnated fabric condenser tape. Benjamin Booth Co., Allegheny Ave. & Janney St., Philadelphia 34, Pa.

T-119 FIBER METER. Automatic weighing and blending assures quality, holds variation to 1%. James Hunter, Inc., P. O. Box 298, Mauldin, S. C.

T-120 PIN DRAFTERS. Textile job report No. 21 tells how Warner & Swasey Pin Drafters help modify jute systems for carpet yarns. Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio.

T-121 UNIVERSAL CARD COILER. Literature describes both head and base swivel for adjustment. Includes data on 90-day free trial. McDonough Power Equipment, Inc., McDonough, Ga.

T-122 RECONDITION OPENING & CLEANING. Bulletin gives whys and wherefores of reconditioning your opening and cleaning lines. Special attention given to each machine with suggestions as to parts replacement. Saco-Lowell Shops, Replacement Parts Div., Box 327, Greenville, S. C.

T-123 COILER CONVERSIONS. Full facts on low initial cost conversion to larger coiler cans. Lists advantages, has complete description. Southern States Equipment Corp., Hampton, Ga.

T-124 CARD DRIVE. Bulletin 301-a describes simple, safe, efficient individual card drive. Southern States Equipment Corp., Hampton, Ga.

T-132 PROCTOR SUPER PICKER. Data sheet gives details of the Proctor Super Picker for use on slabs of baled cotton, or wool and synthetic blends in layers up to 12" thick. Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.

yarn and warp making

T-201 PRODUCTS FOR SPINNING AND WEAVING. Complete line, applications, advantages shown. Dayco Corp., Textile Div., Dayton, Ohio.

T-202 NEW BOBBIN MANUAL. Complete bobbin guide. Lestershire Spool Division, National Vulcanized Fibre Co., Wilmington 99, Delaware.

T-203 SPINDLE OIL. "Gulfspin" insures against excessive wear and eliminates spindle wobble. Gulf Oil Corp., Gulf Bldg., Houston, Texas.

T-205 HIGH SPEED AUTOMATIC QUILLER. Lists advantages and dimensions of "Autocopser." Terrell Machine Co., Inc., P. O. Box 925, Charlotte, N. C.

T-208 PACKAGED SPINNER MODERNIZATION. Details on Collecto-Vac, Open-Aire Creels, Cross-Jet Cleaner, Air Conditioning Bahnson Company, Winston-Salem, N. C.

T-209 SECTIONAL WARPER. Describes full width and sectional warpers for knitting, weaving. Robert Reiner, Inc., Weehawken, New Jersey.

T-210 CONICAL RINGS AND FLYERS. Complete details and specifications. Herr Manufacturing Co., Inc., 318 Franklin St., Buffalo 2, New York.

T-211 PRECISE WINDING MACHINE. For winding pineapple or straight cones and tubes of synthetics. Foster Machine Co., Westfield, Mass.

T-212 AUTOMATIC CLEANING EQUIPMENT. Working details and advantages of the Tri-Rail Cleaner. American MonoRail Co., 111 East 200th St., Cleveland 17, Ohio.

T-216 SPINNING FRAME CONVERSIONS. Big-package, new frame results at half the cost. Meadows Mfg. Co., P. O. Box 10876, Station A, Atlanta, Ga.

T-217 COLLECTO-VAC. New development collects line, fly and broken ends. The Bahnson Company, Winston-Salem, N. C.

T-219 SPINNING AND TWISTER RINGS. Complete details, pictures, price list. Whitinsville Spinning Ring Co., Whitinsville, Mass.

T-223 FACTS ABOUT YOUR FLYERS AND SPINDLES. Advantages of smooth flyer and spindle operation. Ideal Machine Shops, Bessemer City, N. C.

T-227 SPINDLE OILING MACHINE. Features and advantages noted. Wicaco Machine Corp., 4800 Stenton Ave., Wayne Junction, Philadelphia 44, Pa.

T-228 HANDY SPINNING REFERENCE. Shows traveler speeds, sizes of ring flanges. Saco-Lowell Shops, Parts Replacement Division, P. O. Box 327, Greenville, South Carolina.

T-229 UNIRAIL UPTWISTER. Higher yarn quality and better packages at faster speeds. Leesona Corp., P. O. Box 1605, Providence, R. I.

T-230 PRECISION TEXTILE WINDING. Tensions and density control for winding rubber cones. Kidde Textile Machinery Corp., Farrand St., Bloomfield, N. J.

T-231 CONE WINDER. Describes Model 102 winder, including applications. Foster Machine Co., Westfield,

T-232 SHORT CUT TO STAPLE FIBER SPINNING. Ten steps in operation of the Tow Stapler. Turbo Machine Co., Lansdale, Pa.

T-233 WEAVER'S KNOTTER. Instructions as to use, description. A B. Carter, Inc., Gastonia, N. C.

T-234 TEXTILE ROLL COVERINGS. Describes complete line as well as other mill supplies. Armstrong Cork Co., Industrial Div., Lancaster, Pa.

T-239 LARGE PACKAGE TWISTER. Information on new anti-friction Jumbo Twister which carries a 14" bobbin with a 12" build. Meadows Mfg. Co., P. O. Box 10876, Sta. A. Atlanta, Ga.

T-241 PACEMAKER TWISTERS. Folder gives details on high production, outlines notable features. Whitin Machine Works, Whitinsville, Mass.

T-242 RING SPINNING FRAME. Folder presents description, illustrations and specifications of up-to-date Simplex ring spinning frames. Davis & Furber Machine Co., North Andover, Mass.

T-243 ANTI-FRICTION TWISTER BEARINGS. Find out how bearings helped make The Meadows Twister almost friction-free. Fafnir Bearing Company, New Britian, Conn.

T-246 BETTER BEAMS. Information on three ways to make better beams. Kidde Textile Machinery Corp., Farrand St., Bloomfield, N. J.

For further information use Handy Return Card, Page 191

SPARKING AN EXCITING NEW FABRIC CONCEPT

AVRIL®

(FIBER 40) RAYON

You'll be hearing and seeing a lot of Avril® rayon in the coming months. Already hailed as the greatest achievement in cellulosic chemistry, new Avril has a unique combination of strength and inherent stability never before achieved in rayon fibers. Avril is actually the strongest commercial rayon staple ever produced for the textile industry.

EXCEPTIONAL DIMENSIONAL STABILITY—New Avril rayon is exceptionally strong, and shrink-resistant. This makes Avril an ideal fiber to team up with cotton, polyesters, triacetate, and acrylics. Avril rayon actually has all the properties which make it ideal for processing on cotton, modified cotton and any other systems.

MUCH GREATER TENSILE STRENGTH—The wet and dry tensile strength of Avril rayon is far greater than regular rayon. This makes Avril perfect for use alone or with cotton, or synthetic fibers.

BETTER PERFORMANCE—The greater strength and stability of Avril rayon fibers enhance wash and wear performance. Avril rayon maintains its strength extremely well after resin treatment. The absorbency of Avril rayon lends real comfort to apparel fabrics.

IMPROVES APPEARANCE—Avril rayon takes to colors beautifully. Adds greater brilliance and color clarity to cotton and synthetic blends. Avril also improves hand and luster of fabrics.

For complete information on (Fiber 40) Avril developments that are destined to revolutionize a wide range of textile products, contact Merchandising Department, American Viscose Corporation, 350 Fifth Avenue, New York 1, N.Y.

AVISCO AVISCO RAYON

AVRIL® RAYON, THE HIGH-PERFORMANCE FIBER, COMFORTABLE, CAREFREE.

BOOKLETS

T-250 **SPINNING MODERNIZATION.** Booklet shows how lower costs and improved quality are obtained by spinning modernization. Roberts Company, Sanford, N. C.

T-255 **NEW BOBBIN HOLDER.** Details on streamlined, positive latching bobbin holder. Whitehead Die Casting Co., 1140 Zonolite Rd., Atlanta, Ga.

T-256 **HUMIDIFIER PROTECTION** — Brochure tells how "Rustex" can stop rust and corrosion and prevent discolored water in your humidifying system. Odorless and completely harmless to personnel, or goods. Anderson Chemical Co., Inc., Box 1424, Macon, Georgia.

T-257 **COMETSA SPINDLES.** Bulletin gives details of high-precision, vibration free Cometsa spindles. Mr. Edward B. Rock, Terry Hill Road, Lake Carmel, New York, N. Y.

slashing—weaving—tufting

T-301 **COUNTING AND MEASURING DEVICES.** Wide range of counting devices for all types of textile machinery. Veeder-Root, Inc., Hartford, Conn.

T-302 **LOOM SUPPLIES.** Describes complete line. E. H. Jacobs Mfg. Co., P. O. Box 3096, Charlotte, N. C.

T-304 **LOOM PRODUCTION CHARTS.** Celluloid card shows yards per loom per week. Ralph E. Loper Co., Greenville, S. C.

T-306 **THE STORY OF STARCHES.** History and information on manufacture and use of starches National starch & Chemical Corp., 750 Third Ave., New York 17, N. Y.

T-309 **PENFORD GUMS IN TEXTILES.** Describes their excellent properties for warp sizing spun yarns. Penick & Ford Ltd., Inc., 750 Third Ave., New York 17, New York.

T-314 **LOOM REED BOOKLET.** Describes in detail a variety of reeds. Steel Heddle Mfg. Co., 2100 West Allegheny Ave., Philadelphia 32, Pa.

T-315 **COCKER EQUIPMENT.** Information on warp sizer, beam warper, creels, tensions, back-winders, etc. Cocker Machine & Foundry Co., Gastonia, N. C.

T-318 **FORMULAS FOR SLASHING ARNEL.** Includes also information on warping, weaving and quilling. Textile Sales Dept., Celanese Corp. of America, P. O. Box 1414, Charlotte 1, N. C.

T-319 **ECLIPSE STARCHES FOR TEXTILES.** Data sheet describes use of thin-boiling starches in the textile industry, with particular emphasis on warp sizing. Physical and chemical data included. A. E. Staley Mfg. Co., Decatur, Ill.

T-321 **COCKER SLASHERS.** Complete specifications and advantages, including allied equipment. Cocker Machine & Foundry Co., Gastonia, N. C.

T-322 **MOUNTS FOR LOOMS.** Vinyl mount eliminates need for bolts or paste. Clark, Cutler, McDermott Co., 106 W. Central St., Franklin, Mass.

T-323 **UNIFIL LOOM WINDER.** Describes new concept of filling preparation which needs no quilling area. Leesona Corp., P. O. Box 1605, Providence, R. I.

T-324 **ALIGNING LAYS.** Setting instructions for step-by-step aligning. Draper Corporation, Hopedale, Mass.

T-325 **TRAVELING LOOM CLEANER.** Advantages of the new Oscillaire loom cleaner. Parks-Cramer Co., Fitchburg, Mass.

T-326 **DRAPER REPAIR PARTS CATALOG.** Contains illustrations covering all mechanisms and construction with complete listings. Draper Corporation, Hopedale, Mass.

T-328 **TEXTILE MACHINERY PARTS CATALOG.** Describes complete line of Dayco and Thorobred textile parts. Dayco Corp., Dayton, Ohio.

T-329 **COUNTING DEVICES.** Describes complete line of counters for every application. Trumeter Company, 38 W. 32nd St., New York 1, New York.

T-331 **STATIC BARS.** Humorously illustrates how static can be overcome. The Simco Co., 920 Walnut St., Lansdale, Pa.

T-332 **CARE OF DRAPER SHUTTLES.** Describes how longer, trouble-free service may be obtained. Draper Corporation, Hopedale, Mass.

T-346 **FACTS ON NONWOVENS.** Fact file on non-wovens tells of new machinery, new methods of handling fibers, new bonding agents, etc. Curlator Corporation, Textile Division, East Rochester, N. Y.

T-347 **New DRYING SYSTEM.** Describes high capacity, custom engineered drying equipment for tufted plants. Dalton Sheet Metal Co., Inc., Dalton, Ga.

T-351 **AUTOMATIC STOP MOTION.** Complete information available on automatic stop motion for Titan warp tying-in machine. Edda International Corp., 468 Fourth Ave., New York 16, N. Y.

T-353 **BACKING FOR TUFTEDS.** How to get your tufting necessities with one telephone call. Fulton Cotton Mills, P. O. Box 1726, Atlanta 1, Ga.

T-355 **NON-WOVEN FABRICS.** Booklet gives outline of nature and history of non-woven and the manufacturing techniques of today. Booklet 56-219A. Chemical Div., Goodyear Tire & Rubber Co., Akron 16, Ohio.

T-358 **LOOM SUPPLIES.** Information on rod lubricant and applicator, sponge leather bunter, picker. Garland Mfg. Co., 54 Water St., Saco, Me.

T-362 **SIZE THAT SATISFIES.** Information on getting the correct size package for your mill. Also on Bingham line of slasher rolls. Stodghill & Co., 716 Ponce de Leon Place, Atlanta, Georgia.

T-363 **RUBBER COVERED SLASHER ROLLS.** Handy booklet tells how to get longer life and better performance from rubber covered rolls. Includes data on handling storing and grinding. Stowe-Woodward, Inc., Dept C., 181 Oak St., Newton Upper Falls 64, Mass.

T-364 **CONTINUOUS STARCH COOKER.** Booklet shows how the use of continuous cookers for starch assures accurate control, economy, low maintenance in warp sizing and finishing. Clinton Corn Processing Company, Clinton, Iowa.

knitting

T-403 **RASCHEL KNITTER.** Describes new Raschel-type knitting machine. Kidde Textile Machinery Corp., Inc., Farrand St., Bloomfield, N. J.

T-406 **NEEDLE OIL DOES NOT STAIN.** Details on "Gulftex 39" developed for knitting mills. Gulf Oil Corp., Gulf Bldg., Houston, Texas.

T-407 **KNITTING MACHINES.** Information on Wildman "TFS" 30" single section F-F machines and "AL" 30" diameter 32-feed "single purpose" circular interlock machine (rib type) Wildman-Jacquard Div., Draper Corp., Hopedale, Mass.

T-410 **"READING" TYPE 60 F-F KNITTING MACHINE.** Information about the new "Reading" Type 60, 38-section automatic full-fashioned hosiery knitting machine. Write Textile Machine Works, Reading, Pa.

wet processing

T-500 **WEBB GUIDE SYSTEMS.** Folio No. EG-84 describes webb guide

Why Wrinkle Your Brow Over Wrinkles in Cloth?

get

MECHO AIR GUIDER

Streamlined, it is precision-engineered, and accurate to within one-eighth of an inch. It ranges from 1 to 400 ypm.

Mecho's selvage finger is highly sensitive, yet very strong. It will prevent double edges turning on cloth. Mecho's adjustment lever changes the selvage finger tension (to accommodate any cloth from the lightest to heavy #8 duck) . . . *while in operation!*

Everyone engaged in wet processing needs a cloth guider, so make yours Mecho and forget your troubles.

Mecho Air Guiders can do *your* job; they guarantee you "Miles of Cloth without a Wrinkle." They've been standard equipment in hundreds of finishing plants for a quarter of a century! Their efficient and reliable simplicity makes them simply great! Why wait?

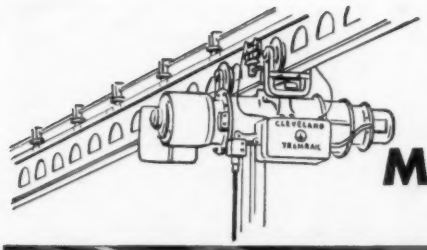
Write today for this helpful FREE Mecho Air Guider Catalog.

THE Guider Specialty Company

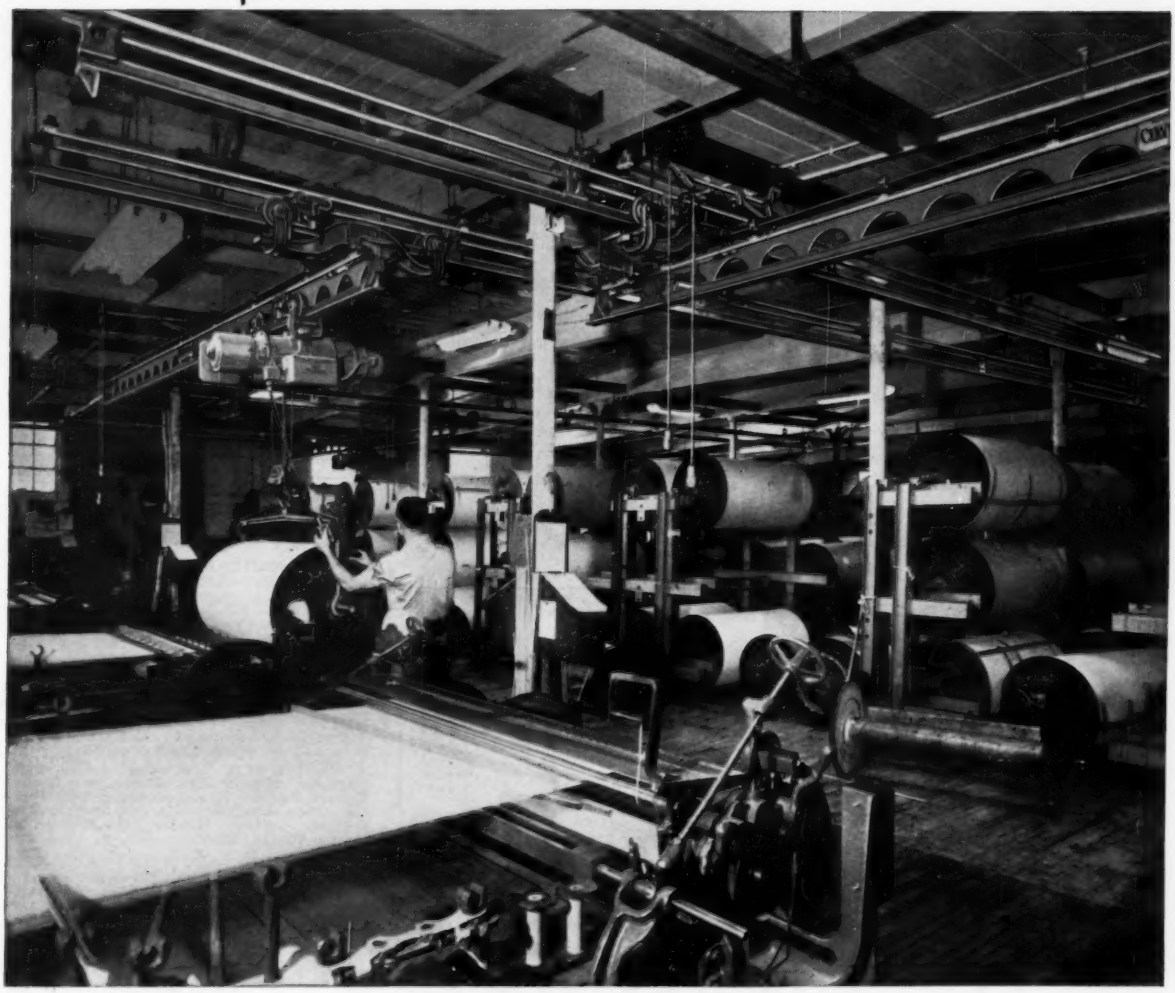
374 State St.—North Haven, Conn.

Southern Representatives

McSpadden & Scantland & Hunter P. O. Box 3635, Charlotte 3, N. C.



Transfer Cranes Make Beam Handling Easy



IN THIS photograph you see a 28 inch beam weighing 1300 lbs. being lifted off a slasher with a Cleveland Tramrail handpropelled crane equipped with an electric hoist. In a matter of seconds the beam is placed into a rack in the Loom Beam Storage.

The Tramrail enables one man to take care of this job easily and safely. It makes possible the use of storage racks because no physical work is required of the operator to lift the beams in and out of them. The racks permit storing more beams in the storage area and provide immediate accessibility to any beam.

Three cranes serve five slashers in this mill. They operate on individual and adjacent runways. They may be interlocked with connecting spur tracks and thus admit a hoist carrier to move onto any crane.

This is one of dozens of types of Cleveland Tramrail applications used widely by the Textile Industry.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 2882 E. 287 ST. • WICKLIFFE, OHIO

BOOKLETS

systems for cloth applications. G.P.B. CONTROLS, INC., 240 E. Ontario St., Chicago 11, Ill.

T-502 **FINISHING MACHINERY.** Text and photographs of complete line of machinery. Marshall and Williams Corp., 46 Baker St., Providence, R. I.

T-503 **WATER ANALYSIS.** Includes tables, conversion factors, indicators, standard solutions. Solvay Process Div., Allied Chemical Corp., 61 Broadway, New York 6, N. Y.

T-504 **UREA FORMALDEHYDE.** Literature on urea formaldehyde or U.F. concentrate-85. Dept. CUFI-29-1. Nitrogen Div., Allied Chemical Corp., 40 Rector St., New York 6, New York.

T-506 **CATIONIC SURFACE ACTIVE AGENT.** Describes Uversoft "D." Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio.

T-508 **PEROXIDE BLEACHING SYSTEM.** Illustrates and describes this continuous system. E. I. du Pont de Nemours & Co., Electrochemical Dept., Wilmington, Del.

T-510 **TEXTILE CHEMICALS.** Describes leading products for wet processors. Royce Chemical Co., Carlton Hill, N. J.

T-512 **DEPUMA.** Decribes odorless, viscous, non-evaporating emulsion for anti-foam. Koppers Co., Inc., Chemicals & Dyestuffs Div., Porter Bldg., Pittsburgh 19 Pa.

T-513 **CATALYST AC-6.** Tells how curing efficiency may be stepped up as much as 25%. Monsanto Chemical Co., Plastic Division, Springfield 2, Mass.

T-514 **SODA ASH BULLETIN.** Contains useful data covering this subject. Solvay Sales Division Allied Chemical Corp., 40 Rector St., New York 6, New York.

T-516 **ALUMINUM CHELATE PEA-1.** Technical data sheet tells how aluminum Chelate PEA-1 may be used with advantage in many applications where aluminum in proplate is unsatisfactory. Harshaw Chemical Co., 1945 East 97th St., Cleveland 6, Ohio.

T-517 **CHEMICAL CATALOG.** Lists products with chemical composition, properties and applications. Anara Chemicals Div., General Aniline & Film Corp., 435 Hudson St., New York 14, New York.

T-519 **HYDRAULIC POWER UNITS.** Describes unit for operating hydraulic textile machines. B. F. Perkins & Son, Inc., Holyoke, Mass.

T-522 **CUT WATER TREATMENT COSTS.** Describes the control of scale, slime, algae and corrosion. Oakite Products, Inc., 126C Rector St., New York 6, New York.

T-526 **PRODUCTS FOR TEXTILE IMPROVEMENT.** Describes products and services designed to provide better fabrics. B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio.

T-527 **SODIUM HYDROSULFITE.** Literature and test samples are available on "T-C Hydro." Tennessee Corp., 617-629 Grant Bldg., Atlanta, Ga.

T-528 **ETHANOLAMINES.** Lists application, chemical and physical properties. Nitrogen Division, Allied Chemical Corp., 40 Rector St., New York 6, New York.

T-531 **ROTARY DYEING MACHINE.** For use in dyeing hosiery, hats, gloves, socks, etc. Turbo Machine Co., Lansdale, Pa.

T-534 **DYEING AND FINISHING MACHINERY.** Complete line presented in series of catalogs. Birch Brothers, Inc., 32 Kent St., Somerville 43, Mass.

T-535 **DYEING, BLEACHING AND DRYING EQUIPMENT.** Complete line for cotton, wool and synthetics described. Color pictures. Morton Machine Works, 1718 3rd Ave., Columbus, Ga.

T-536 **NAPHTHOL RATIOS SLIDE CHART.** Quickly and accurately enables operators to determine Naphthol Ratios. Alliance Color & Chemical Co., 33 Ave. P, Newark 5, New Jersey.

T-540 **PENFORD FINISHING GUMS.** Complete data, including physical properties. Penick & Ford Ltd., Inc., 750 Third Ave., New York 17, New York.

T-541 **REGENERATION OF ZEOLITE WATER SOFTENERS.** Explains advantages of Lixate Process. International Salt Co., Scranton, Pennsylvania.

T-542 **DYEING SNYTHETIC FIBERS.** Detailed analysis of methods and materials. General Dyestuff Co., 435 Hudson St., New York 14, New York.

T-543 **INDUSTRIAL BRUSHES.** Features use on shears, printing machines. M. W. Jenkins' Sons, Inc., 444 Pompton Ave., Cedar Grove, N. J.

T-544 **WASTE HEAT RECOVERY.** Describes system of waste heat recovery from polluted water. Ludell Mfg. Company, 5200 West State Street, Milwaukee, Wis.

T-545 **WASHERS FOR SCOURING, BLEACHING, ACIDIFYING.** Describes high capacity, continuous process washers. C. G. Sargent's Sons Corp., Graniteville, Mass.

T-546 **NAPHTHOL FOR LIGHTFAST BROWNS.** Booklet describes new, straight, non-substantive naphthol. Naphthol As-BN, for the continuous naphtholation of cotton and rayon piece goods in the dyeing of economical, fast-to-light browns. General Dyestuff Co., 435 Hudson St., New York 14, New York.

T-547 **SOFTENER LUBRICANT, NAPPING AID.** Technical information available on softener, lubricant and napping aid for natural and synthetic fibers, yarns and fabrics. Nopco Chemical Co., Harrison, N. J.

T-554 **INSTRUMENT CATALOG.** Complete information on industrial instrument accessories and supplies. Includes specifications, parts numbers and prices. Catalog 500, Foxboro Co., Foxboro, Mass.

T-556 **HUNTER DYEING EQUIPMENT.** Describes fully with diagrams Hunter Model A Dye Becks, Hunter No/Lap Reels, Model S Dye Kettles. Open Width Dye Kettles. Sample Dye Kettles. James Hunter Machine Co., North Adams, Mass.

T-557 **HIGH ACTIVITY CATALYST.** Technical bulletin describes new catalyst AC-6 which provides increased activity, excellent bath life, minimum odor formation, etc. Monsanto Chemical Co., Plastics Div., Springfield, Mass.

T-558 **CATIONIC DYE LEVELER.** Bulletin TX-34 gives new information on dye leveler for acid colors on nylon tricot and wool through use of Nopco 1425-B. Nopco Chemical Co., Textile Chemicals Div., Harrison, N. J.

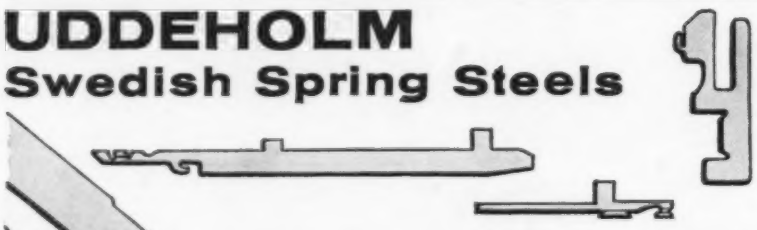
T-561 **PUMP POURABLE PASTES.** Bulletin tells how Moyno pumps can pump any textile liquid that can be forced through a pipe, even if highly viscous or corrosive. Robbins & Myers, Inc., Springfield, Ohio.

T-563 **POLYETHYLENE FINISHING AGENT.** Booklet contains information needed to adopt Emulsifiable A-C polyethylene as a finishing agent to any particular process. Semet-Solvay Petrochemical Div., Allied Chemical Corp., 5th Floor T, Rector Street, New York 6, N. Y.

T-564 **HYDROGEN PEROXIDE BLEACHING.** Booklet discusses advantages, operating details and savings in chemical costs of Activated Hydrogen Peroxide Bleaching Process for Cotton Solvay Process Div., Allied Chemical Corp., 61 Broadway, New York 6, N. Y.

T-566 **ETHYLEX GUMS.** Brochure describes properties of hydroxy ethyl ether derivatives of corn starch. Applications of these noncongealing gums in warp sizing and finishing cov-

UDDEHOLM
Swedish Spring Steels



. . . make these precision textile machine parts . . . better!

To produce these intricate, working parts for textile machines, UDDEHOLM Specialty Spring Steels are specified. Their excellent flatness, finish, uniformity and close thickness tolerance will give you a better product at less cost.

BLUE TEMPERED
ANNEALED
Spring Steels

. . . made by our mills in Sweden . . . are available from our modern warehouses in New York City, Cleveland, Los Angeles and Newington, Conn. Prompt delivery can be made in sizes ranging from .001" to .125" thick — ⅛" to 16¼" wide. Slitting and edging facilities are also available.

Get acquainted with UDDEHOLM . . .
Write today for your UDDEHOLM Spring Steel Catalog.

UDDEHOLM CO. OF AMERICA

155 East 44th St., New York 17, N. Y., MUrray Hill 7-4575

UHB TOOL & DIE STEELS COLD ROLLED SPRING STEELS

Uddeholm Steels—used by American Industry since 1820

Branch Offices & Warehouses—Chicago, Ill.—Cleveland, O.—Detroit, Mich.—Los Angeles, Calif.—Newington, Conn.—Philadelphia, Pa.—In Canada—Uddeholm (Canada) Ltd., Montreal—Toronto

For further information use Handy Return Card, Page 191

BOOKLETS

ered. A. E. Staley Mfg. Co., Box 151, Decatur, Ill.

T-572 **DYEING MACHINERY FOR EVERY PURPOSE.** Illustrated literature available on complete line of automatically controlled machinery. Gaston County Dyeing Machine Co., Stanley, N. C.

T-576 **YARN PREPARATION.** Describes products for yarn preparation, printing, finishing. Polymer Industries, Springdale, Conn.

T-577 **STAINLESS DRY CANS.** Information on stainless steel, 75 psi, reverse dished, head dry cans. Can be furnished Teflon-coated if desired. Sims Metal Works, West Point, Ga.

T-579 **AUTOMATIC GUIDING EQUIPMENT.** Catalog shows various types of automatic guiding equipment for accurate cloth guiding. Fife Mfg. Co., Inc., P. O. Box 9815, Oklahoma City, Okla.

T-580 **AIR SLASHER DRYER.** Shows construction and operating details. Proctor & Schwartz, Inc., 7th St. and Tabor Rd., Philadelphia 20, Pa.

T-581 **BUTT-TACKING SEWING MACHINE.** Describes operation, installation of single thread butt-tacking sewing machine. The Merrow Machine Co., 28 Laurel St., Hartford, Conn.

fibers and yarns

T-601 **FORTISAN-36, NEW TEXTILE FIBER.** Includes charts, diagrams, text, presents technical properties. Textile Sales Dept., Celanese Corp. of America, P. O. Box 1414, Charlotte, N. C.

T-602 **CAPROLAN NYLON HEAVY YARNS.** Describes strength, long flex life and ready dyeability. Fiber Sales Dept., National Aniline Div., 261 Madison Ave., New York 16, N. Y.

T-604 **THE CHEMSTRAND NYLON STORY.** Describes the birth and growth of Chemstrand Nylon. Chemstrand Corp., 350 Fifth Ave., New York 1, N. Y.

T-605 **COLOR-FAST FIBERS.** Further information on "Coloray." Courtauld's solution dyed rayon staple which is a contribution to color fastness in fabrics. Courtaulds (Alabama) Inc., 600 Fifth Ave., New York 20, N. Y.

T-608 **TASLAN TEXTURED YARNS.** Technical information on dyeing and finishing of new fabrics made with Taslan. E. I. du Pont de Nemours & Co., Wilmington 98, Delaware.

T-609 **PROCESSING NYLON STAPLE.** Data sheet describes method of processing Du Pont 42 Nylon Staple in blends with cotton. Covers complete operation through sizing. Bulletin N-93. E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

laboratory

T-701 **TESTING INSTRUMENTS.** Descriptions of 37 instruments for testing textiles. Custom Scientific Instruments, Inc., 541 Devon St., Kearny, N. J.

T-703 **SHADOGRAPH WEIGHING DEVICES.** Pictures and information on various types of scales. Exact Weight Scale Co., Columbus 8, Ohio.

T-705 **STROBOTAC.** Measures speed of rotating, reciprocating or other cyclic motions. General Radio Co., West Concord, Mass.

T-706 **YARN COUNT SCALE.** Data sheet tells how direct-reading instrument provides fast, accurate method of determining yarn number. Exact Weight Scale Co., Columbus 8, Ohio.

services for management

T-801 **FACTORING SERVICE.** Details on advantages of factoring, including information on general banking and pension plans. Trust Company of Georgia, Atlanta, Ga.

T-805 **PROFIT THROUGH FACTORING.** Brochure gives facts on the use of factoring as a modern plan for developing sound business growth and added profits. Walter E. Heller & Co., Dept. TI-2, 105 W. Adams St., Chicago 99, Ill.

T-808 **FACTORING.** Complete details on services offered as mill factors. L. F. Dommerich, 271 Madison Ave., New York, N. Y.

T-810 **THE WONALANCET WAY** is the title of an editorial booklet published five times a year dealing with current cotton problems. Write Wonalancet Company, 128 Burke St., Nashua, N. H.

T-812 **BEECHCRAFTS FOR 1961.** Booklet available from Southern Airways Company shows how Beechcraft executive airplanes can save executives time and money. Write Southern Airways Co., P. O. Box 718, Atlanta, Ga.

T-819 **ORGANIZED LUBRICATION PAYS.** Planning book entitled "Management Practices that Control Costs via Organized Lubrication" shows how to effect savings in five areas of plant operation. Available from Texaco, Inc., 135 E. 42nd St., New York 17, N. Y.

plant operation

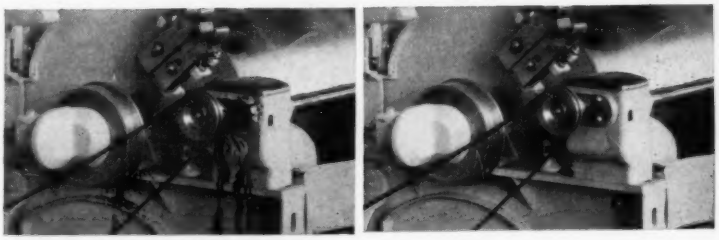
T-902 **BELT LACING EQUIPMENT.** Includes prices, specifications, etc. Clipper Belt Lacer Co., Grand Rapids, Michigan.

T-903 **"MOTOR SELECTOR."** How to select a-c motors for specific application. Bulletin B-2103. Reliance Electric & Engineering Co., 24701 Euclid Ave., Cleveland 17, Ohio.

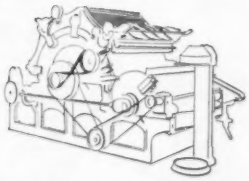
T-904 **GEARMOTORS, MOTORGEARS, AND FLUID DRIVES.** Catalog supplies complete information on double,

NON-FLUID OIL

TRADE MARK REGISTERED



Ordinary Lubricant Drips on Goods NON-FLUID OIL Stays in Bearings



The productivity of your card room may well depend upon the type of lubricant you use. Seven out of ten of the country's leading mills have learned that they achieve highest output when they use NON-FLUID OIL.

Ordinary oil and grease cannot prevent bearing wear because they do not stay in bearings, but drip and spatter onto goods in process. NON-FLUID OIL adheres to bearing surfaces, lubricating and protecting them until entirely consumed.

NON-FLUID OIL is dripless and thus will not damage card clothing and cotton. This means less expense and increased production.

Don't take our word for it . . . send for a free testing sample of NON-FLUID OIL and Bulletin T-5.

NEW YORK & NEW JERSEY LUBRICANT CO.

292 Madison Ave., New York 17, N. Y.

WORKS: NEWARK, N. J.

Sou. Dist. Mgr.: Fred W. Phillips, Greenville, S. C.

1896 65 YEARS 1961 — SIXTY-FIVE YEARS OF LUBRICATION SERVICE TO INDUSTRY — NON-FLUID OIL

WAREHOUSES:

Atlanta, Ga.
Birmingham, Ala.
Charlotte, N. C.
Columbus, Ga.
Greensboro, N. C.
Greenville, S. C.
Providence, R. I.
Chicago, Ill.
Detroit, Mich.
St. Louis, Mo.

NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So-called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

The Man from "Minnesota"

can help you with your safety painting program

A successful safety painting program constantly requires fresh ideas to maintain its enviable record. A new or faltering program needs these, plus the tried and proven methods.

Whether your safety program is new or well-established, the industrial specialists from Minnesota Paints can help you make it easier and more effective.

Read their new textile paint maintenance bulletin, "Prevent Accidents!" and see where scientifically selected safety colors can help promote safety in your mill. Write Mr. P. H. LePeau, Minnesota Paints, Inc., 1101 Third Street South, Minneapolis 15, Minn., for your free copy. No obligation.

MINNEAPOLIS
FT. WAYNE
ATLANTA
DALLAS

Minnesota PAINTS

THE WORLD'S FINEST
POSITIVE-LATCHING
BALL BEARING
BOBBIN HOLDER

HOLDER 44¢
ANY NUT 01¢
BRAKE 05¢
50¢

- Easy tripping — Freest running — Bullet-nosed
- Faster for Operator
- Stainless steel balls and races—No rust drag
- The only thoroughly sealed ball assembly. Prevents lint drag
- Short travel—Requires low headroom
- Wide smooth fingers—Prevents cutting of bobbin inner edges
- Serviced for life at assembly and riveted
- Streamlined die cast and stamped brakes. Six sizes available.
- Shipped assembled
- Finest bobbin holder available at any price
- Available for any size bobbin or rail thru:

Saco-Lowell; Bouligny; Bahnson; Parks-Cramer; Pneumafil; Coleman Co.; Cotton-McCauley; C. A. McAbee; Matthews Equipment Co.

Patented, Manufactured and Guaranteed
WHITEHEAD DIE CASTING CO.
1198 ZONOLITE ROAD—ATLANTA 6, GA.

triple, and quadruple reduction gearmotors and motorgears. Electrofluid and fluid drives are also explained. Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Illinois.

T-907 WRAP UP LINT PROBLEMS. Automatic lint filter removes lint from air, winds it into disposable roll. Bulletin 234, American Air Fiter Co., 215 Central Ave., Louisville 8, Ky.

T-908 TEXTILE MOTORS. Bulletin describes complete line of textile motors. Diehl Mfg. Co., Finderne Plant, Somerville, N. J.

T-909 COMPRESSORS. WB two-stage water-cooled. Space-saving units require modest foundation up to 125 psi and 1150 cfm displacement. Bulletin WB-10. Gardner-Denver Company, Quincy, Illinois.

T-910 MODERN LUBRICATION METHODS. A report to management tells how modern lubrication methods can help save thousands of dollars in three major economic areas of textile plant management. Describes twelve operating advantages of automatic lubrication systems. Lincoln Engineering Co., 4010 Goodfellow Blvd., St. Louis 20, Mo.

T-912 STORY OF NYLON BRISTLE. Tells of discovery and production, with special attention to "Tynex," a form of nylon ideal for use in brushes. M. W. Jenkins' Sons, Inc., 444 Pompton Ave., Cedar Grove, N. J.

T-913 "ONE-SHOT" LUBRICATORS. Bulletin describes wide field of application for one-shot lubricators on machines requiring closely controlled but infrequent oil feed. Bijur Lubricating Corporation, Rochelle Park, N. J.

T-914 INDUSTRIAL GREASES. Describes multi-purpose lithium soap industrial greases. Sinclair Refining Co., 600 Fifth Ave., New York, New York.

T-917 BLOWERS AND EXHAUSTERS Full description, including detailed drawings. Buffalo Forge Co., 490 Broadway, Buffalo 5, N. Y.

T-918 PAINT STRIPPING BOOKLET. Explains simplified method of stripping paint. Oakite Products, Inc., 22 Thames St., New York 6, New York.

T-921 CATALOG OF NEEDLE BEARINGS. Design, application for five types of needle bearings. The Torrington Co., Torrington, Conn.

T-924 BALL BEARINGS FOR TEXTILE MACHINERY. Bearings for all phases of textile processing. The Fafnir Bearing Co., New Britain, Conn.

T-925 LUBRICATION OF BEARINGS. Helpful list of do's and don't to prolong bearing life. New York & New Jersey Lubricant Co., 292 Madison Ave., New York 17, New York.

T-931 NEW V-BELT DRIVES. Bulletin contains information on selection and operation of V-belt drives. Covers all types of V-belt drives. Dodge Mfg. Corp., Mishawaka, Ind.

T-932 SMOOTH ACCELERATION, DECELERATION. Describes eddy-current equipment for smooth, stepless acceleration and deceleration. Eaton Mfg. Co., 3307 14th Ave., Kenosha, Wis.

T-937 V-BELTS. Tells how raw materials and finished belts are tested and inspected. Quality control and experimental production covered. Booklet S-51107, Dept. 794, Goodyear Tire & Rubber Co., Akron 16, Ohio.

T-938 EMERGENCY CHEMICAL CLEANING—Booklet tells how rust, scale and other deposits may be removed from heat exchange equipment, regardless of intricacy. Anderson Chemical Co., Inc., Box 1424, Macon, Georgia.

T-939 BOILER FEEDWATER TREATMENT. Bulletin describes BRAXON & FLAKO internal automatic boiler feedwater treatment and services of trained service engineers in eliminating the problems of scales, sludge, corrosion, etc. Anderson Chemical Co., Inc., P. O. Box 1424, Macon, Ga.

T-940 VARI-SPEED MOTOR PULLEY. Describes variable speed control through use of simplified three-major-part disc-assemblies with only one lubrication point. Reeves Pulley Co., Reliance Electric & Engineering Co., Columbus, Ind.

T-941 BALING PRESSES. Describes complete line of motor-driven and hydraulic baling presses. Logemann Brothers Co., 3150 West Burleigh St., Milwaukee, Wis.

materials handling

T-1005 TRAMRAIL ENGINEERING AND APPLICATION. Data on how Tramrail equipment can cut handling costs. Cleveland Tramrail Div., Cleveland Crane and Engineering Co., 1036 East 289th St., Wickliffe, Ohio.

T-1007 MATERIALS HANDLING FOR TEXTILES. Shows how fibre trucks can increase efficiency, protect products. National Vulcanized Fibre Co., Wilmington 99, Del.

T-1013 TRUCKS DOFF, STORE, BECOME SPOOLER TRAY. Brochure tells how mobile boxes are being used as doff boxes, storage boxes, and spooler trays on Barber-Colman spooler. Fisher Mfg. Co., Hartwell, Ga.

T-1014 CARPET CORES, STORAGE TUBES. Literature on simplified storage and better cores for rugs. Sonoco Products Co., Hartsville, S. C.

T-1015 OVERHEAD CONVEYOR. Catalog features "Cable-Way" Overhead Conveyor which has low-cost, ease of installation, quiet operation and long life. Conveyor Division, The American MonoRail Co., Fourth and Franklin Sts., Tipp City, Ohio.

T-1020 AUTOMATIC WRAPPING. Tells how automatic packaging increases the sales appeal of textile products. Saves labor and materials and adds tamper-proof product protection. Write Hayssen Mfg. Co., Sheboygan, Wis.

T-1021 TUBES, BOBBINS, PIRNS. Information on world renowned yarn carriers, reliable as to stability, dimensions, weight. Emil Adolff (U. S. A. agents: Textube Corp., 695 Summer St., Stamford, Conn.)

T-1022 STRONG CORES. Data on lightweight, quality tubes and cores for textiles. Star Paper Tube, Inc., Rock Hill, S. C.

T-1023 MATERIALS HANDLING. Describes lightweight, durable, smooth products. Spaulding Fibre Co., Inc., Dover, New Hampshire.

T-1024 CONDITIONING TRUCK. Details on all-aluminum, non-rusting conditioning truck. Excel, Inc., Lincolnton, N. C.

FORESIGHT
CAN SAVE YOU . . .
MONEY!

ANDERSON SHIELDS

will reduce . . .
CHIPPING — SPLITTING
BREAKING
of your . . .
SPOOLS AND BOBBINS

Send Us Your Problems:
We Will Cooperate
— To Save You Money.

TEXTILE SHIELD CO., INC.
LAWRENCE, MASS., U.S.A.
SERVING NEW ENGLAND SINCE 1917

PERSONAL NOTES

(from page 44)

he has devoted a large part of his life. Beneath his admirable modesty are outstanding executive ability, imaginative leadership, and vibrant human warmth that have won him universal esteem. To him North Carolina State College is pleased to award the degree of Doctor of Humanities." * * * **Kent Pate,** formerly superintendent of May Hosiery Finishing Co., has been named superintendent of Cameo Hosiery Co., Greensboro, N. C.

Rollin S. Orr and **James N. Grant,** USDA scientists at the Agricultural Research Service's Southern Utilization Research and Development Division, New Orleans, recently received the department's superior service award. The award was presented to the physicists for the ingenious de-

Mr. Orr

Mr. Grant

velopment and application of methods and instruments for measuring the significant properties of mechanically and chemically treated cotton fibers. **John D. Guthrie** and **Robert T. O'Connor** have been named acting chiefs of the cotton chemical reactions laboratory and the cotton physical properties laboratory, respectively.

Benjamin J. Bornstein has been appointed director of plant operations for Standish Mills and Fairfax Mill, both located in Esmond, R. I.

Parke, Davis & Co. recently announced the appointment of **Richard W. Stowe** as personnel manager for the surgical dressings division. Mr. Stowe was formerly personnel manager for the Carlisle (S. C.) Finishing Co.

Wade F. Denning has been named a director of Tuscarora Cotton Mill, Mt. Pleasant, N. C.

At the annual meeting of the South Carolina Textile Manufacturers

Mr. Robertson

Mr. Small

Association, held at Sea Island, Ga., recently, **William F. Robertson,** vice-president of Riegel Textile Corp., Ware Shoals, S. C., was elected president and **Robert S. Small,** president of Woodside Mills, Greenville, S. C., was elected vice-president.

Professor Horton Brown has retired from Lowell Technological Institute, after having spent 30 years with LTI's department of textile engineering.

James V. Corr has been named executive vice-president of Buck Creek Cotton Mills.

Sam A. Neaves, formerly director of operation for the Springfield, Tenn., mill of Chatham Manufacturing Co., has been appointed assistant to the president of the Leaksville division.

Wiley Mayes has been named assistant manager of Glen Raven Cotton Mills, Inc.

Robert Bauer has been appointed a vice-president of Flagg-Utica Corp., to be in charge of fashion knit fabric, yarn, and new product development.

James H. Blore has been named director of fabric development for the knitting division of Laurens (S. C.) Mills.

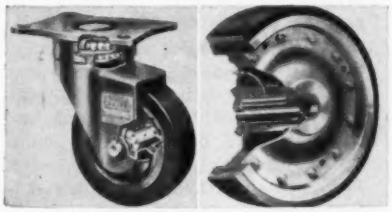
Henry Zenorini has been elected president of Z. B. Yarn Mills, Inc., West New York, N. J., succeeding **Joseph Zenorini, Sr.,** who has retired.

Harry C. Mangold, executive vice-president of Archer Mills, Columbus, Ga., has been appointed administrative vice-president of Wayne Knitting Mills, Humboldt, Tenn.

Charles D. McGoldrick has been named superintendent of dyeing for Clifton Yarn Mills, Inc., Clifton Heights, Pa., succeeding the late Hector A. McCulloch.

Lewis J. Turner, Jr., has joined

DARNELL ···
specialists in
CASTERS & WHEELS
for more than 40 years



WHEN THE BEST IS REQUIRED
DARNELL
IS FIRST CHOICE
for Long-Service Savings

yours for the asking.

DARNELL CORPORATION, LTD.
DOWNEY (Los Angeles County) CALIF.
37-28 SIXTY-FIRST, WOODSIDE 77, L.I., N.Y.
36 NORTH CLINTON ST., CHICAGO 6, ILL.
1000 PEACHTREE N. E., ATLANTA, GA.

PERSONAL NOTES

(from page 183)

the Carlisle plant of Cone Mills Corp., as assistant plant chemist. *** **Robert F. Crews** has been named assistant manager of the Proximity plant.

L. R. Brumby has been named vice-president in charge of research and development for Bibb Manufacturing Co. **John S. Turner,** vice-president in charge of Columbus properties, has been named to the position of vice-president of manufacturing succeeding Mr. Brumby. **McAllister Isaacs** has become general superintendent of the Bibb mills in Columbus, which will include the supervision of the Anderson plant. **C. J. Brogdon** will succeed Mr. Isaacs as superintendent of the Anderson plant.

James L. Jay has joined Fulton Cotton Mills, Atlanta, Ga., as overseer of the new bleachery. **Harold L. Vincent** has been promoted to the position of superintendent of the finishing plant, and **John A. Addison** has been elevated to assistant superintendent.

A. W. (Bix) Gunn has been elected executive vice-president and chief executive officer of Abney Mills, Greenwood, S. C.

At the recent annual meeting of the Southern Textile Association in Myrtle Beach, S. C., the following officers were elected for the ensuing year: chairman of the board—**R. M. McCrary,** Hart Cotton Mills, Tarboro, N. C.; president—**W. B. Etters,** Reeves Bros., Spartanburg, S. C.; first vice-president—**Herman Cone, Jr.,** Cone Mills, Greensboro, N. C.; second vice-president—**D. H. Roberts,** Lydia Mills, Clinton, S. C. Elected to full terms on the board of governors of the Association were: **H. W. Suber,** J. P. Stevens & Co., Inc., Great Falls, S. C.; **Jesse Boyce,** Erwin Mills, Durham, N. C.; **Rodger Hughes,** Reeves Bros., Inc., Spartanburg, S. C.; and **J. P. Hughes,** Cone Mills, Hillsboro, N. C. New officers of the associate members division are **Frank Barrie,** Leesona Corp., Charlotte, N. C., president; and **W. N. Dulaney,** A. E. Staley Mfg. Co., Atlanta, Ga., vice-president.

Stan Mahaffey, overseer of carding and spinning at the Norris plant, has been transferred to the general office of Woodside Mills. **Gerald Dempsey,** formerly assistant overseer, has been named to succeed Mr. Mahaffey.

Mr. Turner

Mr. Brogdon
Bibb Mfg. Co.

Mr. Isaacs

Mr. Brumby
Bibb Mfg. Co.

Mr. Gunn
Abney Mills

Mr. Vincent
Fulton Mills

Mr. Addison
Fulton Mills

Mr. Jay
Fulton Mills

Mr. Suber
J. P. Stevens

J. P. Hughes
Cone Mills

Mr. McCrary
Hart Cotton Mills

Mr. Cone
Cone Mills

Rodger Hughes
Reeves Bros.

Mr. Etters
Reeves Bros.

Mr. Boyce
Erwin Mills

Mr. Roberts
Lydia Mills

Mr. Barrie
Leesona Corp.

Mr. Dulaney
A. E. Staley

Ralph M. Cornman, director of purchases for Collins & Aikman, Corp., will retire at the end of this month. **L. C. Knowles** has been named to succeed Mr. Cornman. *** **P. H. Chance,** general manager of the automotive division, has retired. **Robert M. Stroker** has been named to succeed Mr. Chance.

Harry L. Williams, Sr., chairman of the executive committee, and **Paul K. McKenney, Sr.,** chairman of the board of directors of Swift Manufacturing Co., have retired. **Charlton H. Williams,** president, has been named board chairman.

Lander Barnhill has assumed duties as personnel manager of Groves Thread Co., Gastonia, N. C.

SUPPLIER NOTES

The honorary degree, Doctor of Textile Science, was recently conferred upon **Werner von Bergen,** assistant director of research for J. P. Stevens & Co., Inc., and **Richard B. Stehle,** partner, Brehm and Stehle, at the commencement exercises of the Philadelphia College of Textiles and Science. Recipients of the honorary degree, Doctor of Textiles, were **Herman Blum,** chairman of the board of Craftex Mills, and **Edwin Wilkinson,** president of the National Association of Wool Manufacturers.

Arman Dimeo has joined Silco Knitting Mills, Inc., Woodside, L. I., as vice-president in charge of technical sales and fabric development.

OBITUARIES

Charles Lee Amos, 76, board chairman of Melrose Hosiery Mills, Inc., High Point, N. C.

Harold Lamb Bryan, 58, executive vice-president and secretary of the Union Manufacturing Co., Union Point, Ga.

Jack K. Davis, sales engineer of A. B. Carter, Inc., Phenix City, Ala.

Theophile Guerin, 87, retired president and general manager of the former Guerin Mills, Inc., and owner of Fall River Mills, Woonsocket, R. I.

Irvin H. Hamilton, 63, vice-president of the Schlichter Jute Cordage Co., Philadelphia, Pa.

James W. Hennessy, 65, head of the cost department of Botany Cottons, Inc., Gastonia, N. C.

Rinaldo A. Lukens, 67, a member of the board and a consultant to Gloversville Continental, Gloversville, N. Y.

J. Knowles Milliken, 86, founder and director of Mount Hope Finishing Co., Butner, N. C.

Fred J. Mills, purchasing agent of Swift Mfg. Co., Columbus, Ga.

Arthur Molyneux, 80, former president of the Madison Spinning Co., Philadelphia, Pa.

Charles F. Orr, 90, retired general manager of Waverly Braid Mills, Gastonia, N. C.

William J. Pharr, 31, associated with Stowe Mills, Pharr Yarns, and Pharr Worsted Mills, Gastonia, N. C.

Ben S. Phetteplace, 66, retired general manager of the former Southern Franklin Process Co., Greenville, S. C.

T. Henry Wood, 65, retired vice-president and manager of Calhoun Falls (S. C.) Mills.

Roehlen Engraving Works has announced the completion of their new 60,000 sq ft building at 701 Jefferson Rd., Rochester, New York.

J. Lawrence Orr, formerly sales manager for the Charlotte-Greensboro region, has been transferred to the main office of **Whitin Machine Works** as product manager of cotton machinery. Harry B. Patterson has been named to succeed Mr. Orr, and Lucius M. Hair has been appointed assistant regional sales manager. Mr. Patterson will be headquartered in Greensboro and Mr. Hair in Charlotte.

A pilot plant for the production of HT-1, a high-temperature-resistant polyamide fiber is being constructed at Richmond, Va., by **E. I. du Pont de Nemours & Co., Inc.**

The Firestone Tire & Rubber Co. has announced plans to produce a lofted nylon filament for rugs and carpeting at Hopewell, Va. The firm has acquired the tradename "Nyloft" from the Industrial Rayon Corp., and has begun production.

Turbo Machine Co. is promoting "Turbonized" to describe hosiery dyed and finished in one processing cycle on their Dye-Boarder. Transfers and special packs featuring Turbonizing have been developed by a number of hosiery mills.

Dr. Donald H. Powers has been named assistant director of **Fabric Research Laboratories, Inc.** He was formerly head of research at Warner-Lambert Pharmaceutical Co.

Food Machinery and Chemical Corp. has announced plans to build a multi-million dollar hydrogen peroxide plant in West Virginia. All five of the firm's operating chemical divisions are investigating the possibility of building new facilities at the recently acquired South Charleston Naval Ordnance plant.

Ira L. Dowdee has been named sales and technical representative for **Chemical Processing Co.**

The Selta Corp. has been appointed sales representatives for Beaty hydraulic presses in North and South Carolina, Virginia, Tennessee, Georgia, and Alabama by **James Hunter, Inc.**

Richard V. Scott, vice-president and assistant director of sales for **Bemis Bros. Bag Co.,** has been named director of sales.

Saco-Lowell Shops has announced that Dyersburg, Tenn. Cotton Products, Inc., has installed six SJ Magne-Draft spinning frames and one FS-2 roving frame. An order has been placed for 10 additional spinning frames and one roving frame.

The Torrington Company has announced a $6-million expansion program to provide a new bearings manufacturing plant near Clinton, S. C., and a wire mill adjacent to its Broad Street plant in Torrington, Conn. Initial production at the Clinton plant will include needle bearings and needle rollers. The wire mill will contain 43,000 sq ft of floor space and will draw its own wire from rods for use in the manufacture of needle rollers and needle bearings.

Ground was broken recently for the new plant of **Laconia Needle Mfg. Co.** Located at O'Shea Industrial Park, Laconia, New Hampshire, the 39,000 sq ft building will enable the company to double production.

The main office of the **Andrews & Goodrich** division of Midland-Ross Corp., formerly located in Dorchester, Mass., has moved to 79 Milk St.,

SUPPLIER NOTES

(from page 185)

Boston, Mass. * * * John W. Brownley has been appointed vice-president of marketing for **Industrial Rayon Co.**, a division of **Midland-Ross.**

John R. Longenecker has been appointed advertising manager for the textile machinery division of **Warner & Swasey Co.** In his new post, Mr. Longenecker will be responsible for textile advertising, publicity, and service literature.

Valdemar Jacobsen, **Ciba Company, Inc.** sales representative, has been transferred from the Philadelphia district to the New England district.

W. R. Becker has been appointed manager of the Charlotte, N. C., district sales office for **The Louis Allis Co.** Mr. Becker's territory includes North and South Carolina.

Jack W. Rettew has been named sales manager for the southern divisions of **Fletcher Industries.** Mr. Rettew will be headquartered in Southern Pines, N. C., and will act as liaison between this plant and the Statesville, N. C., operation.

John A. Vollmann has been appointed president of **Robert Reiner, Inc.** Karl T. Marx has been named vice-president.

Gilbert S. Stafford, head of the machine design department and associate professor of machine design at Rhode Island School of Design, has resigned to become engineering manager for the **Dixon Corp.**

Paul G. Logue has been appointed manager of textile sales for **Wica Chemicals, Inc.**

Stanley Brooks has been named executive vice-president of **H. W. Butterworth & Sons Co.** * * * The firm has announced an accelerated program of research and development in the fields of new machinery for the textile finishing and plastics industry.

The Chemstrand Corporation Technical Center in Decatur, Ala., is the newest of Chemstrand's facilities for the application of science, engineering, and technology to wider use and improvement of the company's textile fibers. The Center (top photo) includes the applications research and service department of the marketing division, engineering and development department, and the corporate purchasing department. The complex includes textile laboratories (bottom, left), a commercial-scale dyehouse (bottom right), a tire cord laboratory, engineering facilities, and a pilot plant.

Nopco Chemical Co. has announced the acquisition of six midwest foam companies from D & W Clark Corp. The companies are engaged in the fabrication and distribution of urethane foam, as well as foam rubber, upholstery fabrics, vinyl sheeting, and fiber products used primarily in the furniture, bedding, and cushioning industries. * * * Richard B. Anderson has been named a sales representative for all industrial division products in South Carolina, Georgia, Alabama, Tennessee, Mississippi, and Arkansas.

Hugh K. Smith has joined **A. B. Carter, Inc.**, as sales engineer and will serve the territory covered by the late J. K. Davis.

Joseph J. Harand, formerly superintendent of Delta Finishing Plant #4 of J. P. Stevens & Co., Inc., has joined **Seydel-Woolley & Co.** as technical representative in the finishing division. Mr. Harand will serve the trade in northern and western North Carolina and the state of Virginia.

Luther McGinty and David Greene of Argus Color & Chemical Co., have been appointed sales representatives for the textile division of **General Foam Corp.**

Clinton Corn Processing Co. has announced the appointment of Everett E. Hanke as district sales manager for the New England states. Mr. Hanke will be headquartered in Somerville, Mass.

Mr. Rettew
Fletcher Ind.

Mr. Marx
Robert Reiner

Mr. Vollmann
Robert Reiner

Mr. Logue
Wica

Mr. Harand
Seydel-Woolley

Mr. Anderson
Nopco

$2.10 per hour, and one helper at $1.60 per hour. Double time was allowed for weekend work and a 10 per cent night differential was used for second- and third-shift operations.

Utility costs include those for steam, electrical power, cooling water, and process and wash water. Process and wash water costs were obtained from the local water board schedule. Electricity costs were obtained from the industrial rate schedule of a utilities company serving the textile area of the United States. Unit costs used were 50 cents per 1000 pounds of steam, and 3 cents per 1000 gallons of cooling water.

General expenses are those for general administrative overhead, sales and distribution, and financing.

As indicated in *Table 4*, the total processing cost for the continuous silicone alloy treatment of 5.5-oz cotton poplin, 42″ wide, to a weight add-on of about 2.5 per cent ranged from 4.5 cents per yard, at an annual production of 14.4 million yards, to 3.8 cents per yard at an annual production of 60.5 million yards. *Table 5* shows that the total cost for treating with the silicone alloy-triazone combination would range from 6.7 cents per yard at the lower production figure to 5.7 cents per yard at the higher production.

Total unit processing costs from *Tables 4* and *5* are plotted versus annual production in *Figure 2*. These costs are exclusive of the cost of cotton used and are for custom processing without profit.

TABLE 4
Silicone Alloy Treatment of Cotton Fabric: Processing Costs

Annual plant capacity in millions of yards	14.4	43.2	60.5
Annual operations (days)	250	250	350
Daily operations (hours)	8	24	24
Total plant cost ($)	583,450	592,970	592,970
Processing costs (¢/lin yd)			
Direct			
Chemicals	2.7	2.6	2.6
Labor	0.1	0.1	0.1
Utilities	0.1	0.1	0.1
Other	0.2	0.1	0.1
Total direct costs	3.1	2.9	2.9
Indirect[1]	0.3	0.2	0.2
Fixed[2]	0.3	0.1	0.1
Contingencies	0.2	0.2	0.2
General expenses	0.6	0.4	0.4
Total processing costs (¢/lin yd)	4.5	3.8	3.8

[1]Includes payroll overhead, general plant overhead, control laboratory, and packaging costs
[2]Includes insurance, taxes, and depreciation

TABLE 5
Silicone Alloy-Triazone Treatment of Cotton Fabric: Processing Cost

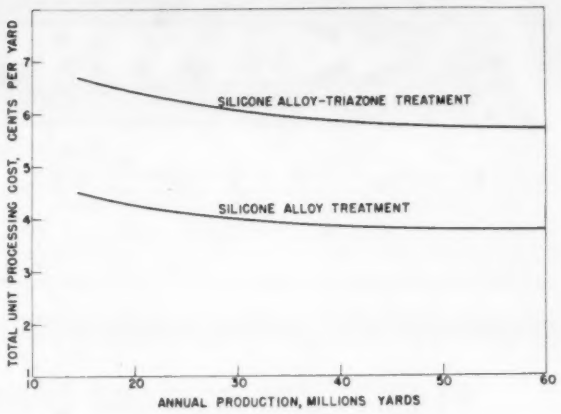
Annual plant capacity in millions of yards	14.4	43.2	60.5
Annual operations (days)	250	250	350
Daily operations (hours)	8	24	24
Total plant costs ($)	817,495	827,126	827,126
Processing costs (¢/lin yd)			
Direct			
Chemicals	4.1	4.1	4.1
Labor	0.1	0.1	0.1
Utilities	0.2	0.2	0.2
Other	0.3	0.1	0.1
Total direct costs	4.7	4.5	4.5
Indirect[1]	0.3	0.3	0.3
Fixed[2]	0.5	0.1	0.1
Contingencies	0.3	0.2	0.2
General expenses	0.9	0.7	0.6
Total processing costs (¢/lin yd)	6.7	5.8	5.7

[1]Payroll overhead, general plant overhead, control laboratory and packaging costs
[2]Insurance, taxes, and depreciation

TABLE 6
Silicone Alloy and Silicone Alloy-Triazone Processing Costs

Annual Production in Millions of Square Yards	Silicone Alloy (¢/sq yd)	Silicone Alloy -Triazone (¢/sq yd)
16.8	3.8	5.7
50.4	3.3	5.0
70.6	3.3	4.9
Annual Production in Millions of Pounds	**(¢/lb)**	**(¢/lb)**
5.8	11.1	16.6
17.3	9.6	14.5
24.3	9.5	14.3

FIG. 2. Costs for silicone alloy treatment of 42", 5.5-oz poplin.



Summary. This preliminary cost study shows that it would cost as little as 3.8 cents per yard to treat cotton with silicone alloy, or 5.7 cents per yard to impart the additional property of crease resistance with silicone alloy-triazone at the continuous rate of 120 yards per minute.

This treatment, which imparts excellent water repellency and crease resistance to cotton, should enable cotton to further its expansion in the rainwear market and enter into the industrial field in areas where the properties of water repellency and crease resistance are desirable.

After soap-soda boiling, the spray ratings of the treated fabrics show very little drop, nor is the fabric hardened or discolored. Other advantages are low curing time and temperature.

References
1. Aries, R. S., and Newton, R. D. "Chemical Engineering Cost Estimation." New York: McGraw-Hill Book Co., 1955.
2. Chilton, C. H., *Chem. Eng.* **56** 97-106 (June 1949).
3. Conner, C. J., Reeves, W. A., and Chance, L. H., *Textile Research J.* **30**, 171-178 (1960)
4. Peters, M. S., "Plant Design and Economics for Chemical Engineers." New York: McGraw-Hill Book Co., 1958.
5. Zimmerman, O. T., and Lavine, I., "Chemical Engineering Costs." Dover, N. H.: Industrial Research Service, 1950.

CLASSIFIED ADS

CLASSIFIED RATES

Rates are net, payable in advance each month. Page is 3 columns, 10 inches deep—30 inches to page. Space measured by even inch vertically by 1, 2 or 3 columns in width. Column width 2¼ inches.
Transient rate for display classified, $16.00 per inch.
Contract rate for space within 12 months period as follows:
12 inches .....$12.00 Per Inch.

POSITION WANTED: 20c per word per insertion; minimum charge $4.00. Cash with order. Box Number address care of TEXTILE INDUSTRIES, 1760 Peachtree Rd., N.W., Atlanta 9, Ga., count as eight words. Advertisements for help wanted, equipment for sale, for rent or wanted, and professional cards are accepted at display rates only.

FLORIDA AND ALABAMA OPENINGS

TEXTILE, MECHANICAL AND CHEMICAL ENGINEERS
PROCESS IMPROVEMENT

The Chemstrand Corporation — producer of Acrilan® acrylic fiber and Chemstrand nylon — needs B. S. graduate engineers with up to five years process assistance or improvement experience in the chemical, textile or chemical textile processing industries for openings in Decatur, Alabama and Pensacola, Florida manufacturing operations.

Assignments involve process and product improvement and modification and technical assistance in day-to-day process problems. Excellent working conditions and supervisory advancement opportunities in well-equipped plants. Attractive southeastern communities on TVA lake in Alabama and on Florida's Gulf Coast offer pleasant, mild climate, enjoyable living, good schools, and plentiful recreational opportunities.

Send resume of education, experience and salary history and requirements in confidence to: **Manager, Employment-Recruitment, Box ENG-1, The Chemstrand Corporation, Decatur, Alabama.**

THE CHEMSTRAND CORPORATION

Decatur, Alabama

POSITION OPEN:

An old and solid New England Print Works needs the services of an additional Colorist. He must be experienced and thoroughly capable of close color matching, and keeping the Print Machines running. He must be familiar with the use of Vats, Pigments, Fiber Reactives, Rapidogens, etc., and application to all cotton fabrics (no mixtures).

This position is an addition to our staff and not a replacement. Our own people know about this ad.

Please send full particulars of your qualifications in first letter.

Salary commensurate with the responsibility. All applications will be held in strict confidence. Reply to Box 125, TEXTILE INDUSTRIES, 1760 Peachtree Rd., N.W., Atlanta 9, Georgia.

WANTED DYER

To locate with progressive southern dyehouse. Must be experienced in all synthetic blends. All benefits. In reply, state details of experience, salary requirements and when available. Reply Box 126, Textile Industries, 1760 Peachtree Rd., N. W., Atlanta 9, Georgia.

PRECISION PIN PLATES

New and Repinning
for all makes tenters
domestic and foreign
K-monel and steel pins
special finish for carbonizing
Send sample plates for quotation.

SOUTHERN TEXTILE WORKS
P. O. Box 406 202 South Towers St.
Anderson, South Carolina

Wanted — Research Engineers

Openings in research division for textile engineer, mechanical engineer, or fiber physicist; experience in textile manufacturing, fiber testing or research desirable; opportunity to develop wide contacts with leading textile scientists and executives; location Washington, D. C. Send complete resume and salary requirements to: National Cotton Council of America, Utilization Research Division, Room 502, Ring Building, 1200 18th Street N. W., Washington 6, D. C.

TEXTILE INDUSTRIES

FIRST IN:

- READERSHIP
- MILL CIRCULATION
- EDITORIAL PAGES
- ADVERTISING PAGES

BOBBINS—BOBBINS—BOBBINS

Our specialty is good used automatic loom bobbins. We also deal in twister and roving bobbins. Send us samples of what you need or what surplus bobbins you have.

CHARLES G. STOVER COMPANY
West Point, Georgia

FOR SALE: 2,000 brand new fibre roving cans, 16" x 36", less than one-half price. OLIVER D. LANDIS, INC., 1805 W. Franklin Ave., Gastonia, N. C., Telephone: 864-3477.

For further information use Handy Return Card, Page 191

INDEX TO ADVERTISERS

A

Acme Steel Co. 58, 59
Aldrich Machine Works ..... Second Cover
Alemite Division of Stewart-Warner Corp. 8
Allen Beam Co. ..... *
Allen Sons' Co., Div., Wm. .... *
Allied Chemical Corp. Corporate Div. ..... *
National Aniline Div., Fiber Marketing Dept. 48
National Aniline Div. 129
Nitrogen Division ..... *
Semet-Solvay Plastics Div. 139
Solvay Process Div. ..... *
Allis Company, Louis 22
American Cyanamid Co., Fibers Div. 116
American Enka Corp. 7
American Gas Association .... *
American Lava Corp. ..... *
American Moistening Co. ..... *
American MonoRail Co., Inc. *
American Viscose Corp. Fibers Division 177
Anderson Chemical Co., Inc. .. *
Anheuser-Busch, Inc. ..... *
Antara Chemicals Div. General Dyestuff Co. ..... *
Armstrong Cork Co. 14, 15, 50, 51
Arnold, Hoffman & Co. ..... *
Association of Industrial Advertisers ..... *
Atlas Electric Devices Co. 38

B

Bahnson Co. ..... *
Barber-Colman Co. (Textile Div.) 172
Becco Chemical Division 133, 134
Bemis Bro. Bag Co. 20
Bijur Lubricating Corp. ..... *
Buffalo Forge Co. 49
Buffalo Pumps, Inc. ..... *
Butterworth & Sons Co., H. W. ..... *

C

Carbic Hoechst Corp. ..... *
Carolina Fiberglass Products Co. ..... *
Carrier Corporation 174, 175
Carter Traveler Co., Div. A. B. Carter, Inc. ..... *
Celanese Corp. of America 60
Central Motor Lines, Inc. .... *
Chemstrand Corporation (Acrilan) 55
Classified Ads 188
Cleveland Tramrail Division, The Cleveland Crane & Engr. Co. 179
Clinton Corn Processing Co. .... *
Clipper Belt Lacer Co. 44
Coats & Clark's Sales Corp. .... *
Cocker Mach. & Fdry. Co. 18
Cometsa Spindle Co. ..... *
Corn Products Sales Co. ..... *
Cotton McCauley & Co., Inc. .. *
Crompton & Knowles Corp. 56
Curlator Corp. Textile Div. .... *
Curtis & Marble Machine Co. ..... *
Custom Scientific Instruments, Inc. ..... *

D

Darnell Corp., Ltd. 183
Dary Ring Traveler Co. ..... *
Davis & Furber Mach. Co. 6
Dayco Textile Products Co. 62, 63
Delta Air Lines ..... *
Diehl Mfg. Co. ..... *
Dixie Bearings, Inc. ..... *
Dixon Corporation 160
Dodge Mfg. Corp. 164
Draper Corporation 1, 47
Dronsfield Bros. Ltd. 170
Duesberg-Bosson of America 166
Du Pont de Nemours & Co., Inc., E. I. (Electrochemicals Dept.) ..... *
Du Pont de Nemours & Co., Inc., E. I. (Finishes Div.) 173
Du Pont de Nemours & Co., Inc., E. I. (Textile Fibers Div.) 57
Duverre, Inc. ..... *

E

Eastman Chemical Products, Inc. Chemicals Div. 146
Fibers Div. ..... *
Eastman Machine Co. ..... *
Eaton Mfg. Co. Dynamatic Div. ..... *
Exact Weight Scale Co. 36

F

Ferguson Gear Co. ..... *
Fiber Controls Corp. ..... *
Fisher Division National Vulcanized Fibre Co. ..... *
Fletcher Industries ..... *
Food Machinery & Chemical Corp., Chlor-Alkali Div. 138
Foster Machine Co. Electronic Sales Div. ..... *
Machinery Div. 42
Foxboro Company ..... *
Franklin Process Co. 152
Fulton Cotton Mills 24

G

GPE Controls, Inc. ..... *
Gardner Denver Co. ..... *
Garland Mfg. Co. ..... *
Gates Rubber Co. ..... *
Geigy Chemical Corp. Geigy Dyestuffs Div. 135
General Dyestuffs Div. 131
General Electric Co., Apparatus Div. ..... *
General Radio Co. ..... *
Gessner Co., David ..... *
Goodyear Tire & Rubber Co., Inc., Chemical Prod. .... *
Gray Company, Inc. ..... *
Guider Specialty Co. 178
Gulf Oil Corp. ..... *

H

Harshaw Chemical Co. ..... *
Herbert Products, Inc. ..... *
Hercules Powder Co. 124
Herr Mfg. Co. 46
Hubinger Co. ..... *
Humble Oil & Refining Co. .... *
Hunter Machine Co., James .... *

I

Ideal Industries, Inc. ..... *
Industrial Dryer Corp. ..... *

J

Jenkins Metals Shops Inc. 169
Jenkins' Sons, M. W. ..... *
Johnson Corp. 166

K

Keever Starch Company ..... *
Kennett Materials Handling Division, National Vulcanized Fibre Co. ..... *
Klauder Weldon Giles Machine Co. 140
Kluttz Rings, Inc. 168
Koppers Co., Inc. Chemicals & Dyestuffs Div. *
Filters Dept. 158

L

Landis, Inc., Oliver D. ..... *
Laurel Soap Mfg. Co. ..... *
Leesona Corporation 30, 31
Lestershire Spool Division, National Vulcanized Fibre Co. ..... *
Lindly & Co., Inc. "See Foster Machine Company" ..... *
Link-Belt Co. ..... *
Livingston & Haven, Inc. ..... *
Lockwood Greene Engineers, Inc. ..... *
Lohrke Co., J. L. 159
Loper Co., Ralph E. 170
Ludell Mfg. Co. ..... *

M

Maguire & Co., Inc., John P. *
Marshall & Williams Corp. *
McDonough Power Equipment, Inc. ..... *
Meadows Mfg. Co. Third Cover
Meese, Inc. ..... *
Merrow Machine Co. ..... *
Mill Devices Co., Div. A. B. Carter, Inc. .... *
Miller Corporation, Harry 11
Minneapolis-Honeywell Regulator Co., Industrial Div. 54
Minnesota Mining & Mfg. Co. ..... *
Minnesota Paints, Inc. 182
Mitchell-Bissell Co. 154
Moisture Register Co. ..... *
Moretex Chemical Co. 167
Morton Machine Works 136
Morton Salt Co. 147
Mount Hope Machinery Co. 118

N

National Starch & Chemical Corp. ..... *
National Vulcanized Fibre Co. ..... *
Nemo Industries, Inc. ..... *
New York & New Jersey Lubricant Co. 181
Nihon Spindle Mfg. Co. ..... *
Nopco Chemical Co. 123
North, Frank G., Inc. ..... *

O

Oakite Products, Inc. ..... *
Olin Mathieson Chemical Corp. 126

P

Pabst Brewing Co. 142
Parks-Cramer Co. ..... *
Penick & Ford, Ltd., Inc. 34
Perfecting Service Company 176
Perkins & Sons, Inc., B. F. .... *
Pioneer Heddle & Reed, Inc. .... *
Pneumafil Corp. 168
Polymer Industries, Inc. 141
Proctor & Gamble Distributing Co. 141
Proctor & Schwartz, Inc. ..... *
Putnam Chemical Corp. ..... *

R

Reiner, Inc., Robert 155
Reliance Elec. & Engr. Co. 52, 53
Reuland Electric Co. 45
Rhoads & Sons, J. E. ..... *
Robbins & Myers, Inc. ..... *
Robert & Co., Associates, Inc. ..... *
Roberts Co. 2, 3
Rockwell-Standard Corp., Air-Maze Div. ..... *
Rohm & Haas Company ..... *
Royal Worcester Industrial Ceramics Ltd. ..... *
Royce Chemical Co. ..... *

S

Saco-Lowell Shops 9, 35
Sandoz, Inc. ..... *
Sargent's Sons Corp., C. G. .... *
Schlumberger & Cie., N. ..... *
Scholler Brothers, Inc. 143
Service Recorder Co., The .... *
Seydel-Woolley & Co. 43
Shell Chemical Co. ..... *
Shell Oil Co. ..... *
Simco Company ..... *
Sims Metal Works 32
Sonoco Products Co. 33
Southern Airways Co. ..... *
Southern Machinery Co. 61
Southern Shuttles Div. ..... *
Southern States Equip. Corp. 10
Southern Textile Works 188
Spraying Systems Co. ..... *
Square D Company ..... *
Staley Mfg. Co., A. E. ..... *
Standard Oil Co. (Kentucky) 26
Steel Heddle Mfg. Co. ..... *
Stewart-Warner Corp., Alemite Division 8
Stover Co., Charles G. 188
Stowe-Woodward, Inc. ..... *

T

Taylor Instrument Companies ..... *
Tennant Co., G. H. ..... *
Tennessee Corp. ..... *
Terrell Mach. Co., Inc. 12, 13
Texaco, Inc. 37
Textile Apron Co. ..... *
Textile Industries 39
Textile Machine Works ..... *
Textile Paper Products, Inc. 16
Textile Shield Co. 182
Theiler Corp., H. J. ..... *
Ton-Tex Corp. ..... *
Torrington Co., The 148
Trust Company of Georgia 28
Tsudakoma Industrial Co., Ltd. ..... *
Turbo Machine Co. 156

U

Uddeholm Co. of America, Inc. 180
Union Steel Products Co. ..... *
Uster Corporation ..... *

V

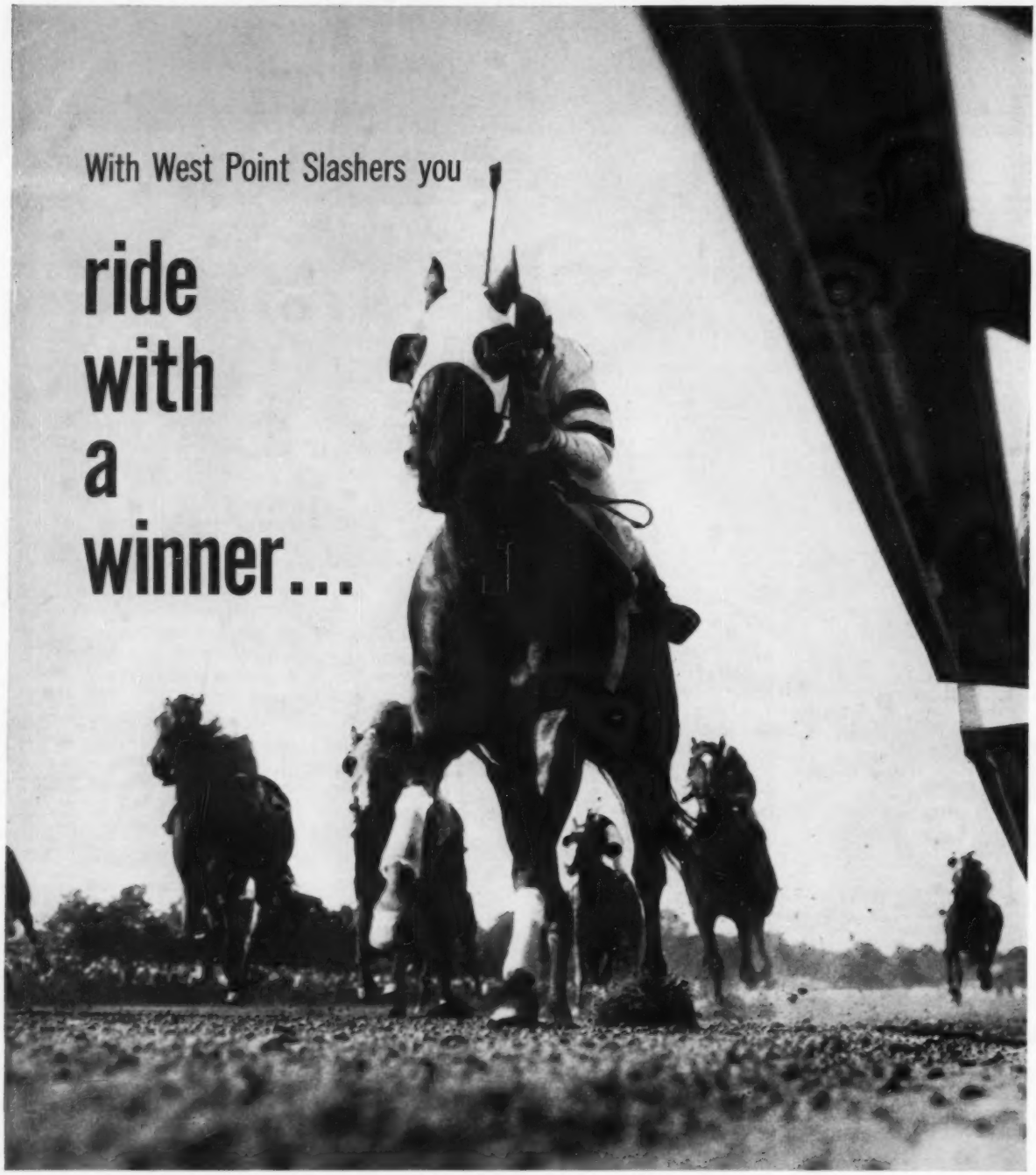
Veeder-Root, Inc. Fourth Cover
Venango Engineering Co. .... *
Visking Corporation 158

W

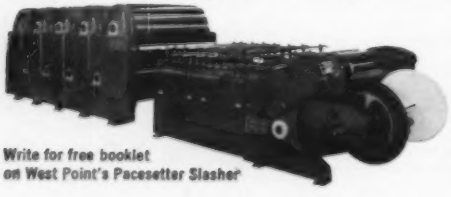
Want Ads 188
Ward Steel Company ..... *
Warner & Swasey Co. ..... *
Watson & Desmond ..... *
West Indies Chemical Works, Ltd. ..... *
West Point Fdy. & Mach Co. 190
Westinghouse Electric Corp. .. *
Whitehead Die Casting Co. 182
Whitin Machine Works 40, 41, 64
Whitinsville Spinning Ring Co. ..... *
Wildman-Jacquard Co. 150
Wolfe & Co. Jacques 123
Wonalancet Company ..... *

Y

Young Aniline Works, Inc. 144
Young Machine Co., F. A. .... *



Performance proves leadership. That's why the West Point Pacesetter is the industry's largest selling slasher today. More than 200 new Pacesetters installed in three years are producing more warps and better warps faster for leading mills. Go to West Point for slashers! West Point Foundry & Machine Company, West Point, Georgia.



Write for free booklet
on West Point's Pacesetter Slasher

TI'S INFORMATION CENTER

BOOKLETS • NEW EQUIPMENT • ADVERTISEMENTS

Help yourself to free literature and more details on any products mentioned in this issue.

Instead of writing a dozen manufacturers for literature and information on products, services or supplies, simply fill in the card below and mail to TEXTILE INDUSTRIES. We'll ask the manufacturers to send the material you want and we pay the postman.

Also below you will find a postage paid subscription card. If you have to **borrow** your copy of TEXTILE INDUSTRIES each month, fill out this card and you will begin receiving your own private copy regularly for two years. Under this rate, each copy costs you just 11½c! The price on the cover is 50c per copy, so you be the judge as to whether this is a bargain or not!

TI pays the postman!

Gentlemen:

You may enter my subscription to TEXTILE INDUSTRIES at your thrift rate of $3.00 for two years (or if you prefer $2.00 for one year).

Enclosed find $3.00 **Send bill for $3.00**

(Mailing address)
Name _____

P. O. Box or Street and No. _____

City _____ **State** _____

CLASSIFICATION DATA—VERY IMPORTANT—PLEASE FILL IN

Name of mill or firm connected with _____

Kind of Textile Mill or kind of business _____

If an individual fill in title of your position _____

Enclose card with remittance. If you want to be billed, send card alone.

AUGUST, 1961

Send free information on these NEW PRODUCTS and/or services (fill in key numbers):

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Send this FREE LITERATURE (fill in key numbers):

_____ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____

Send free information on these ADVERTISEMENTS:

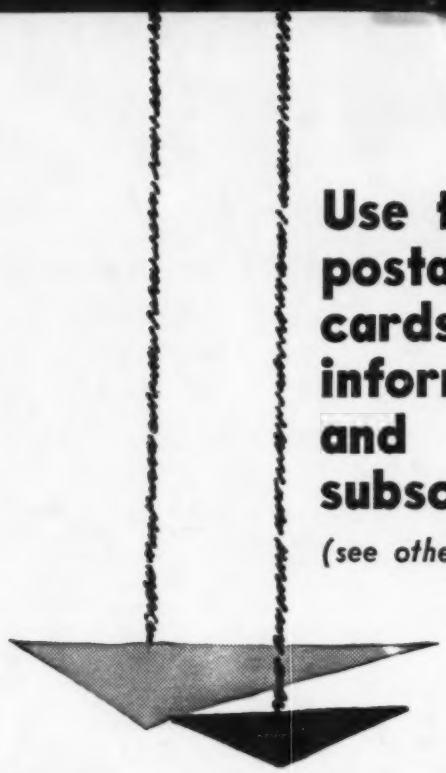
Company	Page	Company	Page
Company	Page	Company	Page
Company	Page	Company	Page

My Name _____ **Position** _____

My Company's Name _____

Address (number and street) _____

City _____ **Zone** _____ **State** _____



Use these postage-paid cards for information and subscriptions

(see other side)

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Textile Industries

1760 PEACHTREE ROAD, N. W.

ATLANTA 9, GEORGIA

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 582, SEC. 34.9, P. L. & R., ATLANTA, GA.

Textile Industries

1760 PEACHTREE ROAD, N. W.

ATLANTA 9, GEORGIA

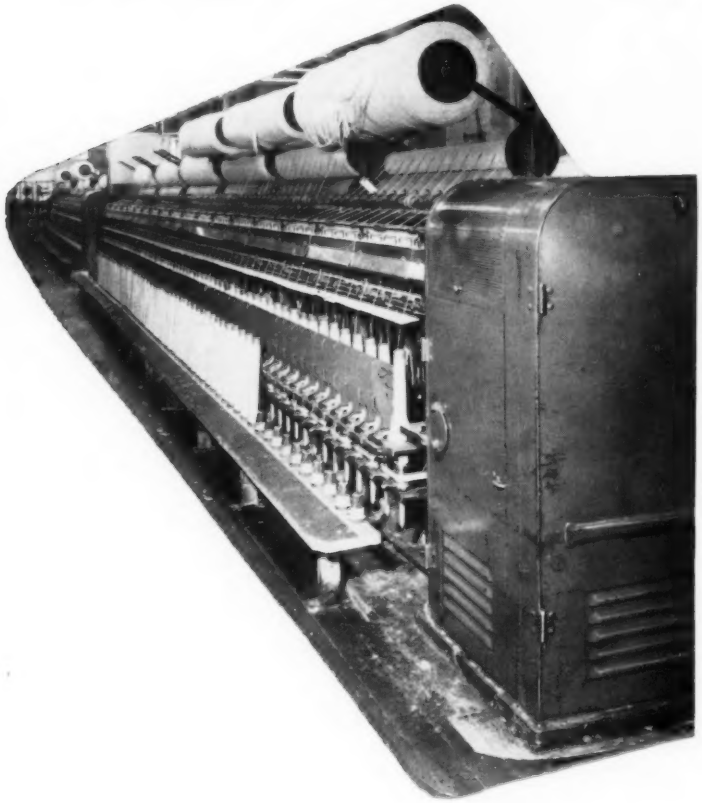
MEADOWS

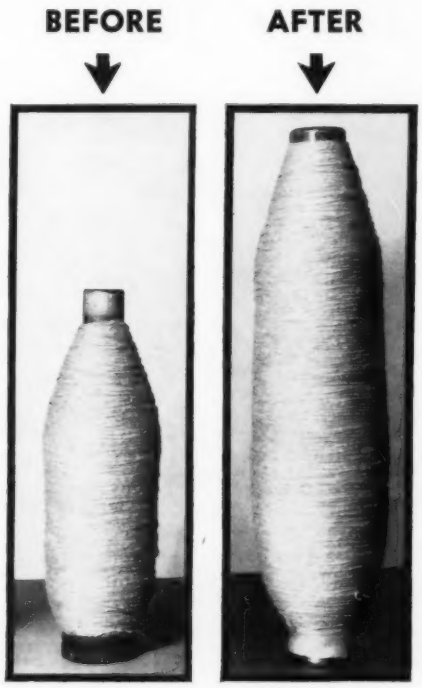
WOOL SPINNING CONVERSION

"Econospin"

The "Econospin" conversion now makes your present wool spinning frames the most efficient and economical way to spin wool yarns. The "Econospin" gives you traverses up to 16" and produces packages with up to 100% more yarn.

New Anti-friction spindles, coupled with statically and dynamically balanced individual drive pulleys, result in greatly increased spindle speeds with little or no maintenance problems.





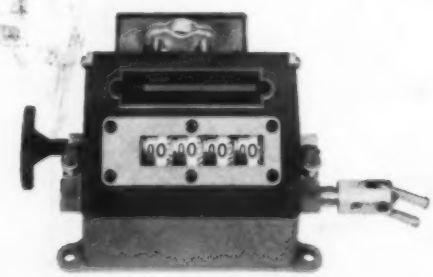
MEADOWS MANUFACTURING CO.

Established 1931

Atlanta 10, Georgia, USA

Write us, Post Office Drawer 10997 **Phone us, PLaza 5-1663** **Visit us, 1190 Astor Ave. S.W.**

Veeder-Root predetermining counter assures uniform yardage . . . boosts efficiency throughout the mill. Ideally used on drawing, spinning, roving, winders and warpers, this high-speed electrical counter prevents overruns, eliminates waste, stops shortages. Like all Veeder-Root textile counters it's precision engineered to build your profits and is backed with Veeder-Root's well-known service policy. Want details? Write Textile Manager, Veeder-Root Inc., Hartford, Conn., or Greenville, S.C. count on...VEEDER-ROOT



Easy to reset, this predetermining counter acts to make or break a circuit, turn on a light or stop the machine after a desired run. Also features finger-tip reset and rugged construction.